COMPUTERWORLD

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NEWSPAPER

CW Photos by A. Dooley

Some scenes from this year's NCC: Another opening, another show (top); a terminal gets a screen test (bottom left); and show visitor finds everything he reads is over his head. Conference coverage continues through Page 26.

NCC a Low-Key Show Despite Record Crowds

By the CW Staff

ANAHEIM, Calif. — Hardware on the exhibition floor vied with software in the technical sessions last week as more than 80,000 people poured into Mickey Mouse's hometown for the National Computer Conference.

This year's version of the annual gathering of the DP crowd — and the first with a decidedly international flavor — was low-key in spite of the "record" crowds claimed by the American Federation of Information Processing Societies, Inc., which sponsors the show.

The exhibit hall itself was marked by mainly OEM exhibits and devoted almost exclusively to hardware, while the technical sessions of most interest to DPers revolved around software and data base in particular.

Exhibits Dominant

But, as usual, the group that went to the technical sessions was outnumbered by 4 or 5 to 1 by the number that were either exhibiting or just exhibit guests — although the data base and software sessions drew some of the world's leading authorities.

Users coming to gather information on distributed data processing and the coming integration of voice, data and record communications were amply treated with exhibits on the floor; however, those who were looking for software packages on the floor were probably disappointed as the software vendors were dwarfed by their hardware brethren.

The clack of printers was constant — interrupted slightly in the West Exhibit Hall where a group of birds was trapped by the makeshift enclosure.

International Flavor

For the first time, NCC also came alive as a truly international gathering — almost in spite of the xenophobia displayed by the major speakers.

While almost all of the major speakers — from the keynoter on down — warned of the problems U.S. industry will face from the coming invasion of Japanese competition, users flocked to the booths of Japanese vendors, lured by the promise of low prices and higher reliability than available here.

And in addition to the Japanese, non-U.S. participation — led by a huge delegation from Scandinavia, South America and Germany — added flavor to both the sessions and exhibit floor.

But in the end Mickey might have won out, since almost as many people visited Disneyland as the other world on the exhibition hall floor. It may be difficult to tell which was more real.

Next Generation of DBMS? 'Relational,' Say Experts

By John Whitmarsh
CW Staff

ANAHEIM, Calif. — What's the shape of the next generation of data base management systems (DBMS)? In a word, relational.

That was the consensus of a four-person panel of data base experts from business and academia at the National Computer Conference here last Monday afternoon.

No commercial relational data base systems are yet available, but their appearance on the market is due "in the next two years," according to Prof. Michael Stonebraker of the University of California at Berkeley.

"We will be deluged with relational systems very soon," Stonebraker said, noting that relational development is nearing the end of the 10-year cycle between conception of the idea and its appearance in the marketplace.

The new generation of data base architectures will emerge from the interaction of three forces, according to Dr. Michael Blasgen of IBM Research in San Jose. Blasgen heads IBM's System R relational data base project.

The forces for change in future data base systems are research ideas, technological advances and user needs. Among Blasgen's predictions for the future:

- The relational model will prevail.
- The full function of distributed data bases is needed by only a fraction of distributed applications.
- Data base machines — no matter what the configuration — face a difficult price/performance battle.
- Natural language query, specifically unrestricted English and pseudo-natural languages, are doubtful except for limited applications. The cost is too high.

"The closer we get to the end user, the harder the problems get," Blasgen said.

The use of natural languages in data

(Continued on Page 4)

Tandem the Tops

By E. Drake Lundell Jr.
CW Staff

DELRAN, N.J. — Users of minicomputers and small business systems think Tandem Computers, Inc.'s units are the tops. The same users put systems from General Automation, Inc. on the bottom of their list.

Those are some of the results from the widest ranging survey of user experience with computer systems ever undertaken by Datapro Research Corp. here.

In all, 2,309 users responded to the minicomputer part of the survey, listing more than 3,437 installed systems and rating their systems on 87 separate items. Computers from 34 different vendors were rated by the users.

This report is based on statistics compiled by Datapro Research Corp.'s Editorial Division, headed by Elizabeth F. Severino. Complete charts of user ratings are on Pages 44 through 60.

On a four-point scale with 4 repre-

(Continued on Page 8)

Software Costs Can Be Tamed, Developers Told

By Marcy Rosenberg
CW Staff

ANAHEIM, Calif. — Yes, there are ways to improve the economics of software.

The costs associated with software development — like so many other things that tend to run wild — can be tamed if breeding takes place in a well-ordered environment.

Creating a well-ordered development setting for software gives the developer the power to control not only the one-time costs, but also the recurring costs, according to Fred P. Tatar, manager of software support and operations at Ford Aerospace & Communications Corp.'s Western Development Laboratories division in Palo Alto, Calif.

Tatar shared what he called his "Camelot affair in software development systems" with session attendees at the National Computer Conference here last week. The object of his affections is the Development Support Machine (DSM) concept that was two-and-a-half years in the making at Ford Aerospace.

DSM consists of a Digital Equipment Corp. PDP-11/70 with "programmer's workbench software" running under AT&T's Unix time-sharing operating system.

Also associated with DSM are design support tools such as hierarchical design languages and system simulation programs, plus compilers and other implementation support tools for programmers.

Ford Aerospace uses DSM for software development and personnel training.

(Continued on Page 8)

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Editor E. Drake Lundell Jr.

Managing Editor Nancy French

Senior Editors:
Industry Marcia Blumenthal
Software Marcy Rosenberg
Communications Brad Schultz
Systems Rita Shoor
Features John C. Whitmarsh

Senior Writer:
Communications Phil Hirsch

Correspondents:
West Coast Jeffry Beeler
Washington, D.C. Jake Kirchner

Writer/Analyst Marguerite Zientara

Staff Writers Tom Henkel
Bruce Hoard
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Chief Copy Editor Cheryl M. Gelb
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Steve Milmore
Barbara T. VanScoyoc

Photography Editor Ann Dooley

Editorial Assistants Denise Petski
Martha Taylor

Editorial Cartoonist Jim Orton

Contributors:
Education J. Daniel Couger
Taylor Reports Alan Taylor
Human Connection Jack Stone

For Sales, Circulation and Production contacts, see inside back page.

Please address all correspondence to the appropriate department at 375 Cochituate Road, Rte. 30, Framingham, Mass. 01701. Phone: (617) 879-0700. Telex: 95-1153

OTHER EDITORIAL OFFICES:

West Coast: 407 California Avenue, Suite 10, Palo Alto, California 94306. Phone: (415) 328-8064.

Washington, D.C.: 821 National Press Building, 529 14th Street N.W., Washington, D.C. 20045. Phone: (202) 347-6718.

England: Steve Burton, IDG Publishing Ltd., 140-146 Camden Street, London NW1 9PF Phone: 01-267 1201. Telex: 851 264737.

W. Germany: Eckhard Utpadel, CW Publikationens, Friedrichstrasse 31, 8000 Munich 40, Phone: (089) 34-90-61. Telex: 5215350.

Asia: Hidetsuna Sasaki, Dempa/Computerworld Company, Dempa Building, 1-11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141. Phone: (03) 445-6101. Telex: J2424461.

Australia: Alan Power, Computerworld Pty. Ltd., 37-43 Alexander Street, Crows Nest, NSW 2065. Phone: (02) 4395133, Telex: SECCO AA25468.

Brazil: Eric Hippeau, Data News, Computerworld do Brazil, Servicos e Publicacoes Ltda., Rua Alcindo Guanabara, 25/10th floor 20031 Rio de Janeiro, RJ Brazil. Phone: (021) 240-8225. Telex: 2130838(WORD BR).

Mexico: Kevin Kelleghan, Computerworld de Mexico, Oaxaca 21-2, Colonia Roma, Mexico City 7 D.F., Phone: (905) 514-4218, (905) 514-6309.

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Xerox Says Local-Area Ethernet to Feature 98% Transmission Throughput Efficiency

By Phil Hirsch
CW Washington Bureau

ANAHEIM, Calif. — Transmission throughput efficiency of 98% is one key feature of the Ethernet local-area data communications network Xerox Corp. is developing in collaboration with Digital Equipment Corp. and Intel Corp., a Xerox official said here last week at the National Computer Conference.

Growing use of computers and intelligent terminals, combined with a desire among users to escape the limitations of telephone company-provided local loops, has created interest in local-area networks and an expectation among Xerox and several other computer and terminal vendors of a big market in the '80s. The Ethernet technical specifications that the three companies are jointly developing (see story on Page 117) are intended to become industrywide standards.

David Liddle, vice-president for systems development in Xerox's Office Products Division, said at NCC that prices and delivery schedules for the first Ethernet commercial products will be disclosed during the fourth quarter of this year. One of these products will be the already announced 860 word processing system. Liddle declined to talk about the other one.

Ethernet is a passive, coaxial cable-based transmission bus to which a wide variety of smart and dumb terminals can be attached via transceivers. The system also accommodates digitized voice transmission. It was designed for a single building complex — such as an office or industrial park — containing large numbers of on-line terminal devices.

Using baseband digital transmission, the Ethernet cable can carry up to 10M bit/sec. Through one or more "gateways," the network connects its users to long-distance telephone circuits and other outside networks.

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Possibly the most appealing feature of Ethernet, aside from a high bit rate, is its elimination of the cost and complexity of conventional switching. Instead, each terminal contends for a place on the cable. But through use of a patented "collision recovery" system embedded in the transceiver, the effects of interference are largely eliminated.

Each transmitted bit must travel to the receiving station and back again within a given time interval. If this does not happen, it is assumed that a collision with another message has occurred and the bit is retransmitted.

A random delay is programmed into each terminal's transmission control system to prevent the same thing from happening again. According to Liddle, this scheme is the main reason for Ethernet's high throughput.

Bits are packetized before being transmitted, and each packet contains a 48-bit address field that is large enough to give every receiver a unique identification. The transceiver is programmed to accept only those messages containing specified address codes and to ignore all others.

The formatting of the packets is performed by a very large-scale integrated (VLSI) microprocessor-on-a-chip that typically is part of the terminal device interfaced to the cable. Since the chip is completely self-contained, it does not have to borrow memory or processing capability from any intelligent terminal to which it may be connected.

Relation to X.25

The specifications to be developed by Xerox, Intel and DEC are expected to be published in the third quarter of this year. They will define the electrical connections and link-level communications protocol to be used on Ethernet.

These are similar to the first three levels of X.25, the international packet network protocol. Liddle emphasized, however, that the Ethernet protocol is related only structurally to X.25. Operationally, they are totally different because X.25 was designed for polled networks while Ethernet utilizes contention to allocate transmission capacity.

Furthermore, the protocol being developed jointly by the three companies will not extend beyond the link level. Each partner, however, may — on its own — add higher levels to the basic Ethernet protocol, analogous to the higher levels now being negotiated internationally for packet networks.

"Xerox is providing the basic design represented in the Ethernet network capability," the partners said in a jointly issued press release. "Digital Equipment Corp. is providing system design expertise in the area of communications transceivers and micro-, mini- and mainframe computer networks. Intel is providing expertise in the partitioning of complex communications functions into microcomputer systems and VLSI components."

The press release added that use of the specification by other corporations and organizations will be encouraged.

Xerox will also license its Ethernet patents to interested manufacturers.

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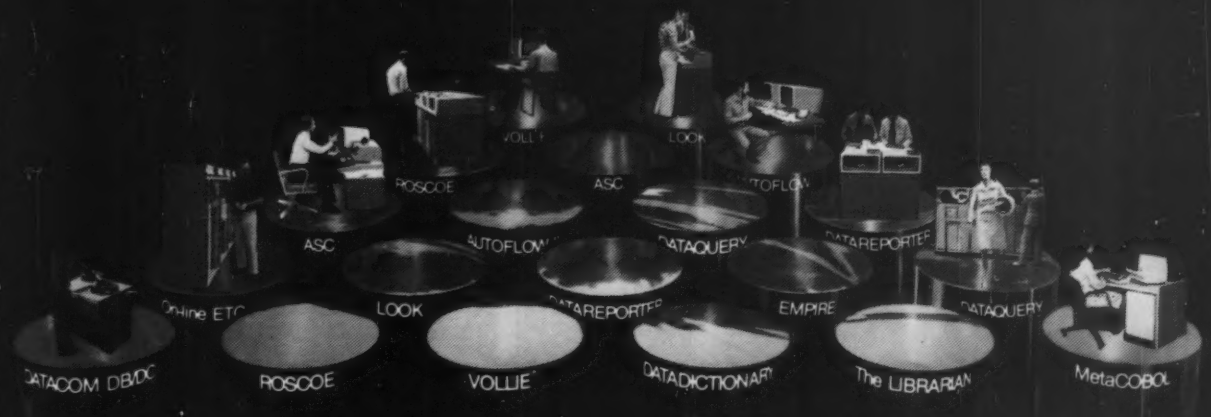

ADR's Integrated Network of Systems Software Products

Harris Supports 3270 Users

Protocol-Changing Controller Leads Debuts

By Brad Schultz
CW Staff

ANAHEIM, Calif. — Users can change their IBM communications protocols with a controller series unveiled by Harris Corp. at last week's National Communications Conference here.

One of the major communications-oriented product announcements at NCC '80, the Harris 9210 and 9220 controllers, are compatible with IBM's 3270 terminal family and handle both local and remote traffic in IBM's Systems Network Architecture/Synchronous Data Link Control (SNA/SDLC) or binary synchronous networks.

The 9200 controllers can attach locally to IBM host systems in 3272 or SNA modes at channel speeds, a spokesman said. Remote links to the host run at speeds up to 9,600 bit/sec.

In an SNA/SDLC environment, the 9200s handle half-duplex, flip-flop and send/receive communications, the spokesman said. Under the binary synchronous protocol, the controllers handle Ascii and Ebcdic formats over full- or half-duplex facilities.

The 9220 controller has all the 9210's capabilities plus support for concurrent communications with more than one host computer system. A user with hosts in two distant cities operating under SNA or binary synchronous protocol can run communications with each host through the 9220 at the same time, the spokesman explained.

The 9200s allow users to shift from SNA to binary synchronous, or vice versa, with "minimum effort," he claimed.

Harris is also offering a number of peripheral devices for the 9200 series. The Model 9278 CRT terminal has three display intensity levels and screen sizes in the 960- to 3,440-character range; keyboards come in data entry, typewriter and keypunch styles.

Printers for the 9200 controllers include both dot matrix, bidirectional models with print speeds of 80-, 130- and 180 char./sec and band printers that deliver 240- or 300 line/min, according to Harris.

A "basic" 9200 system including the

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processor, six CRT terminals and a single 130 char./sec bidirectional printer costs $23,306. It can be leased for three years at $665/mo. Harris' Data Communications Division is at 16001 Dallas Parkway, Dallas, Texas 75240.

Network Management

In other communications news at NCC '80, Four-Phase Systems, Inc. introduced a network management system called IV/10 and showed OMS/-IV, its already announced office management system "for the distributed processing environment" [CW, May 19].

Within a cluster of Four-Phase computer systems, the IV/10 controls operations such as application updates, program compiles and line traces. Tasks can be initiated centrally for any number of remote facilities, the vendor maintained.

The network management system was also said to provide a remote terminal subsystem for "an application-transparent interface to multifunction and stand-alone software systems operating on Four-Phase processors." The IV/10 employs the SDLC protocol.

Intended to support concurrent on-line and batch data communications as well as local computing, word processing, electronic mail and "executive services," the OMS/IV emulates IBM's binary synchronous 2780, 3780, 3270 and Hasp protocols. The office management system also handles the 3770 and 3270 protocols under SDLC.

An extended version of the IV/10, requiring 480K bytes of memory, costs $17,500. It can be leased for $325/mo. A basic IV/10 costs $15,020 and leases for one year at $315/mo.

The vendor's address is 10700 N. DeAnza Blvd., Cupertino, Calif. 95014.

Speech Recognition

Another NCC debut was that of Heuristics, Inc.'s Model 7000 speech recognition unit for terminals with the RS-232C communications interface. "The 7000 will enable technicians, business executives and others who don't type, or whose hands or eyes are busy with other tasks, to enter information onto their computers directly with virtually no errors," a spokesman claimed.

The unit can be trained to recognize up to 64 words or phrases, each up to 3 sec in duration of pronunciation. The 7000 is reportedly compatible with Cobol, Fortran, Basic and Pascal. It costs $3,000.

Heuristics is at 1285 Hammerwood Ave., Sunnyvale, Calif. 94086.

A dumb terminal was announced by Lear Siegler, Inc. at NCC '80. The Model ADM-3A-Plus is reportedly similar in design to the vendor's ADM-3A, but offers faster data entry.

Among the extended features are separate cursor control for single stroke up, down, left and right; a key that locks the terminal into upper case mode; and full upper and lower case character sets with two dot descenders. The 1,920-char. dumb terminal runs asynchronously in half- or full-duplex modes in the 75- to 19.2K bit/sec range. It costs $945. Lear Siegler is based at 714 N. Brookhurst St., Anaheim, Calif. 92803.

Finally, Computer Devices, Inc. released a Programmed Applications Terminal (PAT) for end users. The Model 1206/PAT executes Basic source programs that are automatically called and loaded via minicassette or other media when the computer is switched on.

The terminal features a 64K-byte processor and comes with an 80-column, 50 char./sec thermal printer, integral minicassette drive, built-in modem and acoustic coupler. The entire unit weighs only 17 lbs. and costs $5,195.

Computer Devices is at 25 North Ave., Burlington, Mass. 01803.

Next DBMS? 'Relational'

(Continued from Page 1)

base systems was given a thumbs-down by the panel. "Natural languages are notoriously nontransportable," commented Dennis McLeod of the University of Southern California at Los Angeles.

"Natural languages do not work well now and won't work much better in the near future," Stonebraker added. Nevertheless, he predicted the appearance of natural language front ends that will make "neat sales tools for the vendors and will come into the market in the next few years. Despite the vendors' feelings that these front ends will impress the socks off the end user as sales tools, we should not underestimate them."

The chief problem with natural and pseudonatural languages, IBM's Blasgen explained, is that "it is impossible to predict whether the system will accept the sentence because of the complexity of the grammar."

Chief Features

What are the chief features of the next DBMS generation? For starters, they will be more graphically oriented, Beatrice Yormak of Interactive Systems Corp. believes.

"One reason for this is that the typical user of a DBMS will change," she said. "DBMS will be heavily used in office-of-the-future applications by users who can be assumed to have no knowledge of data base technology.

"This means that current DBMS architectures — which not only assume a well-defined relationship between entities, but also make the tacit assumption that the user has a prior knowledge of these relationships — will be less useful in the next generations," she observed.

Yormak envisioned a second major trend in computing. That will be "to incorporate more of the enterprise's information into data bases. The new technologies of video and laser disk will be more prevalent, making it inexpensive *and* convenient to store vast amounts of data.

"It will become routine to use these technologies for the storage of information that is now handled manually."

This development carries a price, however. "What this implies is a DBMS that is more 'navigational' in nature — one that allows the user to query almost randomly and one that does not require a vast amount of knowledge of logical structure," she noted. Systems like Spatial DBMS will emerge as "the typical DBMS."

A third requirement of the next generation of DBMS will be to incorporate semantic information into the data.

"This means that procedures for controlling semantic integrity will need to be handled by the DBMS," Yormak explained. "As data being stored becomes more qualitative in nature, semantics will play a very important role. A need will arise for the DBMS to provide a mechanism for the 'naive' user to define semantics and to query and retrieve via semantic content."

The implication, Yormak said, is that data models, as now known and loved, will be less important to the DBMS end user.

The difficulty of data base design was reaffirmed by Stonebraker, who agreed with IBM's Blasgen that the most difficult years are still ahead.

The problems are especially acute in distributed data base design. Many academic and industry prototypes exist, but "nobody knows how to deal with concurrency control and crash control, and nobody knows how to design a data base for one machine, let alone multiple machines."

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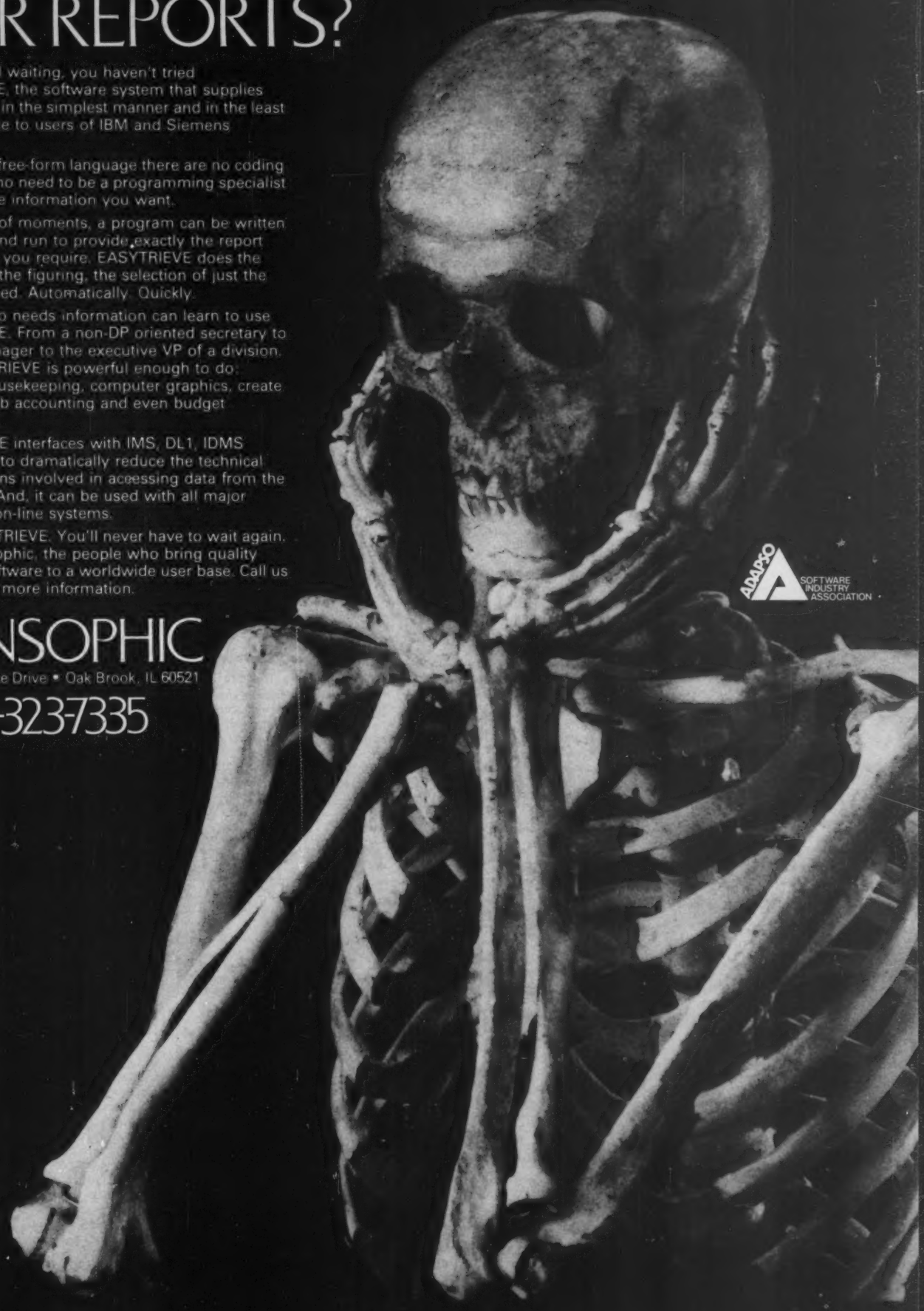

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Zilog Offers Local, Packet-Switched Net Design

By Brad Schultz
CW Staff

ANAHEIM, Calif. — A local data network architecture for commercial users was introduced by Zilog, Inc. at the National Computer Conference here last week.

The Z-Net packet-switched architecture supports DP, electronic mail and office automation applications, a Zilog spokesman said. Small businesses can use the local net for Cobol-based, multiterminal tasks such as inventory control and order entry.

Z-Net's design calls for distributed control points linked by the coaxial lines used in cable TV. Zilog's MCZ-2 microcomputers and a cartridge disk subsystem — the Shared Data Station (SDS) 2/01 — can serve as Z-Net nodes, which are joined to the coaxial lines by a wall-mounted transceiver.

Each SDS 2/01 holds a common data base for the various MCZ-2 microcomputers in the network. The disk subsystem's storage space can be increased in 10M-byte increments from a 10M-byte minimum to a 40M-byte maximum capacity, the spokesman said.

Single-Channel Architecture

The main idea behind the Z-Net design is distributing a system's low-cost elements such as CPU, memory and terminal while sharing such high-cost elements as peripherals and data bases.

With the single-channel architecture, computing power expands as more nodes join the network. That is because the processor at each node — an MCZ-2 or the 64K-byte Z-80A within an SDS 2/01 — is dedicated to a single user, the spokesman explained.

"For the same reason, a processor failure at any one station has no effect on the rest of the system," he said, "unlike time-shared computer systems."

The SDS 2/01 contains a hierarchical, multiuser file manager with record-level locking and unlocking and support for the subsystem's full 40M-byte range of storage. This software is packaged with the rest of the subsystem in a 30-in. rack for the office environment.

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Up to 255 stations, in any combination of MCZ-2s or SDS 2/01s, can be supported by Z-Net. The stations may be deployed at desks, office spaces and auxiliary rooms in a number of buildings along a total coaxial cable length of two kilometers.

Unified Net

According to the Zilog spokesman, Z-Net gives the commercial user an opportunity to build a unified network of diverse computing devices. The MCZ-2 microcomputer can serve as a universal controller for peripherals in firms converting to decentralized DP and electronic mail applications.

Under Zilog's RIO/CP operating system and network protocol software, the MCZ-2 can break applications into modular subtasks that are executed concurrently. And these modules can communicate with each other, regardless of whether they are resident on the same CPU or on different CPUs in the network.

"This is the real power of the Z-Net architecture," the spokesman asserted. "It makes communication between tasks across the network completely transparent to the application."

The application program discerns no difference between a user interacting with local floppy-disk storage or with the network's shared storage, he explained. Similarly, a control program servicing I/O devices under Z-Net reportedly can pass status information or data to a task running anywhere in the network as if that task resided at the same station.

Thus, Zilog claims that multiple-task programs developed on one MCZ-2 micro can run on any other computer or combination of computers in the local network without modification.

"Dependence on system configuration is [therefore] taken out of applications software," the spokesman maintained.

The SDS 2/01 half-removable, half-fixed-disk subsystem costs $13,750. The 2/01 network station transceiver, required to join an SDS 2/01 or MCZ-2 to coaxial lines, costs $950. And the third main component of Z-Net, a network protocol software package, has a license fee of $200 per system.

Although best known as a manufacturer of microprocessors, Zilog began marketing desktop computers last year and has entered the data communications marketplace with the Z-Net announcement. The Exxon Enterprises, Inc. affiliate is headquartered at 10340 Bubb Road, Cupertino, Calif. 95014.

PE Beefs Up Megamini Software

By Marcy Rosenberg
CW Staff

ANAHEIM, Calif. — Action in the 32-bit superminicomputer arena is heating up.

At the National Computer Conference here last week, Perkin-Elmer Corp. (PE) brought out an enhanced version of its year-old Reliance I integrated transaction processor and introduced an associated interactive query system, both for its 32-bit Megamini processors.

The firm is also providing new versions of its 32-bit Ansi Cobol-74 and RPG-II compilers.

With these software announcements, PE becomes the third major manufacturer to bring new offerings to the commercial 32-bit superminicomputer market in the last month.

Data General Corp. entered the market with its first 32-bit processor, the Eclipse MVS-8000, and associated software at the end of April [CW, May 5], and Digital Equipment Corp. followed close behind with a host of VAX-11/780 software enhancements [CW, May 12].

Runs on 3220s, 3240s

Called Reliance II, PE's enhanced transaction processing system runs on the 3220 and 3240 processors. Among its features are an improved access security system, capability for message switching between terminals, a facility for background processing of low-priority transactions, an automatic restart option and Integrated Transaction Controller (ITC) support for its Model 1250 dial-up, 9,600 bit/sec terminals.

Geared for distributed processing environments, the expanded security capability includes user IDs and passwords, plus passwords for each screen-form transaction type, which are categorized into groups by application and personnel job level. As a result, the system can authorize terminal access by password group, according to Kenneth I. Cohen, line-of-business manager for commercial software.

Another difference from Reliance I, which allowed only one control terminal, is that under Reliance II any terminal in a network authorized by the security system can function as the controller. Reliance II also offers user-to-user mail capability allowing any terminal, controller or otherwise, to send messages to any other.

The updated transaction processor also allows multiple Reliance environments to operate concurrently on the system.

For ease of operation, an interactive query system, not previously available to Reliance I users, runs under Reliance II as a set of vendor-supplied transactions.

Priced separately, IQ/32 is said to allow screen-form fill-in-the-blanks definition of retrieval criteria. Fields to be presented are selected separately and output can be viewed either on a CRT terminal or printer, the vendor stated.

Updated Cobol and RPG-II compilers boost performance — measured in time to execute generated code — by between 30% and 50% and between 5% and 15%, respectively, Cohen claimed.

Available now, an initial license for Reliance II costs $12,500. IQ/32 licenses for $3,000; Cobol, for $5,000; and RPG-II for $2,500.

A typical configuration including all software, a 70-terminal system, 1G bytes of disk storage, two tape drives and bisynchronous communications to an IBM 370-type host costs $400,000.

All products are available from PE's Computer Systems Division at 2 Crescent Place, Oceanport, N.J. 07757.

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Honesty, Pay, Challenge Cited as DPers' Needs

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — The keys to "How to Recruit, Develop and Retain Top DP Talent" lie in management honesty, fair compensation based on performance and the availability of new challenges to high performers.

Addressing a crowd of about 300 at the National Computer Conference here recently, Donald P. Owens, manager of DP sales and marketing for the Fox-Morris executive search firm in Philadelphia, cited an 18% growth in the demand for DP professionals from 1979 to 1980.

"The rapid growth of the industry, as well as the critical housing market that has stymied relocations, has resulted in a shortage of technical people to fill many vacant jobs," Owens noted. In the face of such difficulties, Owens suggested a DP manager who needs technical personnel will find that employees already within the company are often his best source of talent.

"You already know these people, and a transfer to a better position within the company is always a moral booster for employees," he emphasized, noting that this valuable resource is "often ignored."

Outside Sources

Other potential sources of personnel are business associates, professional and trade associations, alumni placement services and "Forty-Plus" clubs, many of whose members have "very, very impressive credentials," Owens said.

Customers and competitors also offer talent sources, "although the best approach in such situations may be through a third-party recruiter to avoid conflicts or hurt feelings."

In addition, industry and trade publications lend high visibility to DP talent. "Look for names, achievements, awards and quotations and keep notes on them for future reference," he said.

In recruiting personnel, a manager must decide whether he will do the recruiting himself or look to a third-party recruitment or search firm. "While doing one's own recruiting is less expensive and the manager knows best what he wants, it is also extremely time-consuming, and the firm gives up the confidentiality offered by a third-party recruiter.

"The most effective efforts result from a combination of an in-house recruitment effort and the use of an effective, respected third-party employment agency or executive search firm," he claimed.

Preparing for Interviews

Once recruitment efforts begin bringing in responses, the challenge is to identify potentially outstanding, high-performance DP employees. "The single most important element in such an evaluation is past performance: what the candidate has accomplished so far," Owens emphasized.

In addition, "companies often forget they, too, are being interviewed by hard-to-find talent," he noted, adding, "The first impression an applicant receives of a firm can send a candidate on his way if it is negative."

A manager should prepare for each interview beforehand, Owens counseled. "Know the job content and specifications, know the applicant's background, establish interview objectives and structure the interview instead of letting the applicant structure it."

Owens also suggested that recruiting managers:

- See that the receptionist knows the candidate's name and is expecting that person.
- Don't ask the applicant to fill out an employment form at the time of the interview, but rather before or after.
- Don't make the applicant wait more than 15 minutes for the interview. If the recruiter is late, he should apologize "just as you would expect the candidate to apologize if he were late."
- Never conduct extensive interviews by telephone.
- Have a potential executive interviewed by an executive, not the assistant director of personnel.

CW at NCC

- Don't resent the candidate who has done research on the company and asks pointed questions.
- Be honest and forthright about job content, responsibilities and chances for advancement, since "false expectations are a cause of fast turnover."

Developing Potential

As for developing the potential of DP employees, "there must be a marriage between a human resources development plan and DP management," asserted Jim Stallard of the Computer Services Division at General Dynamics Corp. in St. Louis.

"If management identifies the skills necessary for each position and tells employees what training is necessary to fill the requirements, then the employees themselves will be driving the plan by asking how they can get to the next step.

"Make it clear that some positions are based on competency and some are based on competency *and* vacancy," Stallard warned. "Don't raise expectations unrealistically."

High performers need many challenges. "You have to change and vary assignments often in order for high performers to learn," he added.

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Mini Users Rate Tandem at Top, GA at Bottom

(Continued from Page 1)

senting "excellent," Tandem users gave their systems a 3.8 overall satisfaction rating to top the list and to lead among the three primarily distributed data processing (DDP) suppliers in the survey. GA systems received only a 2.3 from their users.

In the category of traditional minicomputer manufacturers, Texas Instruments, Inc. led the ranking with a 3.5 overall satisfaction level.

The survey found that mini users which buy their systems from the traditional mini makers are happier with their systems than those who buy minis from mainframe vendors. Users that purchased systems from mainframe vendors generally rated their systems at 3 or under while those that purchased systems directly from mini makers rated their systems higher.

Furthermore, users of small business computers are generally happy — all gave their systems a better-than-3 rating. DDP users also rated their systems above 3 in general.

Here's an area-by-area rundown of how the users rated their vendors. Only those systems rated by at least 10 users are included:

• *Traditional Mini Makers:* TI led this group of eight firms with GA at the bottom, perhaps because of the problems that firm has been encountering on a corporate level for the past few years.

TI users expressed an overall satisfaction level of 3.5 and 98% said they would recommend their systems to other users. The 17 that plan to buy new equipment this year will get it from TI.

Following TI in this category is Hewlett-Packard Co., whose users gave their equipment a 3.4 rating on the scale; 87% of the HP users indicated they would recommend their equipment to others.

Next in line is Prime Computer, Inc. with an overall rating of 3.3 and 95.3% of the users willing to recommend the systems.

Digital Equipment Corp. is tied for the next spot with Perkin-Elmer Corp.; both got ratings of 3.1 from their users. Eighty-four percent of Perkin-Elmer's users would recommend their systems and 82% of the DEC customers would do likewise.

Data General Corp. was next in line with a 3.0 rating and only 73% of its users willing to recommend the systems. Dropping below the 3.0 level of satisfaction were Modular Computer Systems, Inc. with a 2.7 overall satisfaction rating and 69% of its users willing to recommend their systems, then GA with its 2.3 rating. Only 40% of the GA users would recommend their systems to others.

• *Mainframe Manufacturers:* As a group, the mainframe manufacturers that also market minicomputers did not fare as well in their users' eyes as did the other groups.

However, IBM, which was a distant sixth in user opinions about mainframes [CW, May 19], tops the list in this group with its mini systems, receiving a 3.1 in overall user satisfaction. But while it is tops here, only 72% of its users would recommend their systems to others.

IBM is followed by NCR Corp. whose users rated its mini systems at 3.0, although 42% of the NCR users would not recommend their systems to others. Next in line is Honeywell, Inc. with a 2.9 rating and with 75% of its users willing to recommend their systems.

Following Honeywell was Univac with a 2.6 rating, even though 54% of its users would not recommend the systems, and Burroughs Corp. with a 2.5 rating, 54% of whose users *would* recommend their equipment.

• *DDP Vendors:* Besides giving Tandem the highest rating in the survey of those with 10 or more users responding, 100% of the Tandem users said they would recommend their systems to other users, also topping the list.

Wang Laboratories, Inc. follows in this category. Its users gave Wang systems a 3.3 overall satisfaction level and 87% said they would urge others to get similar equipment.

Next is Datapoint Corp. with a 3.1 rating; 84% reported they would recommend the equipment. Four-Phase Systems, Inc. got a 2.9 rating and 82% of its users would recommend that equipment.

• *Small Business Computers:* The makers of small business systems all received ratings above 3. They were led by Qantel Corp. and Microdata Corp., each of which received a 3.4 rating.

Eighty-four percent of the Microdata users and 80% of the Qantel users would recommend their systems to other users.

The other firm in this group — Basic Four Corp. — came in at a respectable 3.2.

Datapro's Biggest Survey

Datapro Research Corp.'s 1980 "Annual Survey of User Opinion of Computer Systems" represents the largest survey of its type ever undertaken in the U.S. It summarizes the experiences of 4,614 users of mainframes, minicomputers and desktop computer systems.

In all, 14,990 users were contacted by mail for the survey; their names were drawn from selected portions of the *Computerworld* subscriber list. Each was contacted twice.

Responses came from 5,337 users. After careful analysis, 4,614 responses were judged valid, resulting in a 31% valid response rate.

In the area of mainframes, 2,006 users rated a total of 3,885 systems of 75 model types from 12 vendor categories [CW, May 19].

In the area of small systems, presented here this week, 2,309 users rated 3,457 minicomputer systems of 116 model types in 32 vendor categories (including "other") and 299 users rated 549 desktop and microcomputer systems in 23 models in 18 vendor categories.

Each surveyed user answered 87 questions in 14 different categories about the equipment it had installed — leading to a wealth of information on how users use systems and what they think about them.

Full survey results and an analysis by Datapro researchers is available for $25. Datapro's address is 1805 Underwood Blvd., Delran, N.J. 08075.

Costs of Software Tamed

(Continued from Page 1)

Before DSM was born, the company had no complaints about its software development procedures, had libraries of programs and felt it was keeping up with the state of the art, Tatar recalled. In fact, Ford's software business escalated to millions of dollars per year, and software now accounts for between 80% and 90% of the systems the firm develops.

There were problems, however. "We were hurting for a platform," Tatar commented, referring to the software development group. "We were in contention with the hardware group for machines to use for development."

Not only has DSM given software development engineers the machines they need, but it also provides them with tools that are standard. By creating a standard way of doing things, Tatar's division is less dependent on specific individuals' expertise.

And because DSM provides machines and other resources to allow parallel development by as many as 48 programmers, it has significantly minimized the problem of contention for resources.

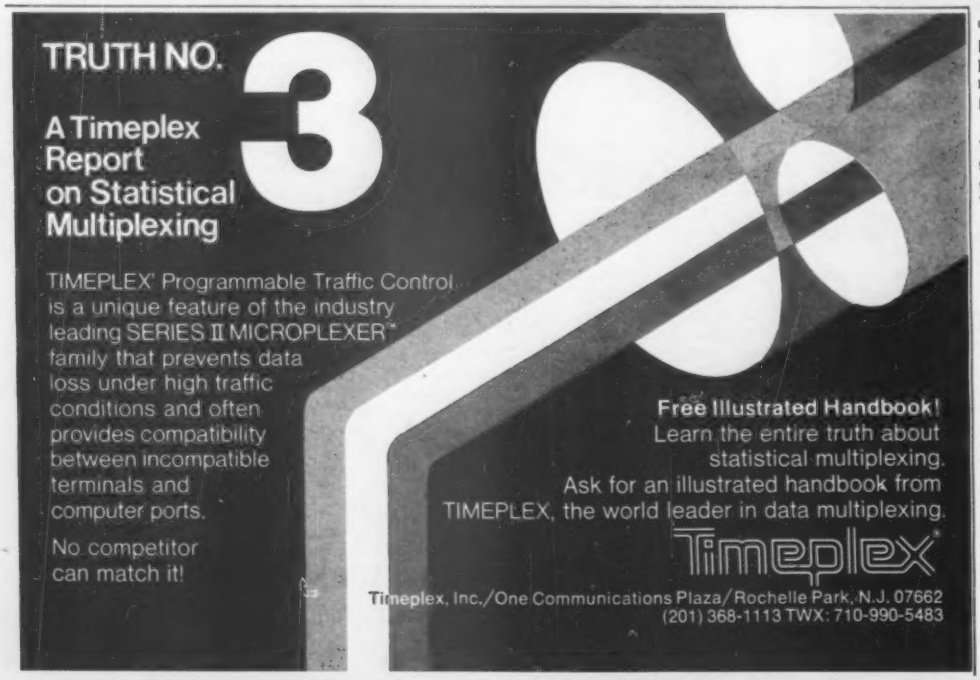
The fact that DSM has created a well-organized working environment supported by the proper tools has also served to boost morale "significantly," Tatar maintained.

But how do these benefits realized through DSM translate into savings of software development costs?

Since implementing DSM, Tatar claims a 15% increase in the company's hit ratio for attracting new employees and a 30% drop in turnover. He attributes this directly to DSM because he maintains the working environment it creates is attractive.

Pre-DSM productivity in Tatar's group measured out to an average of from one-half to one line of code per hour, where lines of code include everything from JCL to commentary. To give an idea of how productivity affects software development costs, Tatar said that an average productivity rate of eight lines of code per day costs about $1 million per year.

DSM boosted productivity about 25%, while increasing employee skill level by 100%, Tatar contended.



Poll at Convention Center Shows

Minis, DDP, Software Draw Users to NCC

By Nancy French
CW Staff

ANAHEIM, Calif. — Interest in minicomputers, distributed data processing (DDP) and packaged software were what drew most users to the National Computer Conference here last week, according to an informal poll taken at the convention center.

There is nowhere else but NCC that one can look at all the new equipment and get a feeling for what's really happening, said Ben Mossberg, a systems analyst for the Department of Civil Engineering at the University of Southern California (USC).

Benjamin S. Aitken, DP manager for Stanley Drapery Hardware of Wallingford, Conn., agreed. He added that the great plus offered by NCC is the opportunity to "talk to all the salespeople and get a large number of facts without pressure to buy."

USC's Mossberg came to the show to see "the new 32-bit minicomputers." USC, which has many makes and models of computers installed, is always interested in "how to get more for less," Mossberg said. The show provided a good way to see new disk storage equipment, terminals and plotters, he added.

Robert Jackovich, director of corporate planning for Nortron Corp. in Sunnyvale, Calif., was looking last week for a system to replace his small Qantel 1400 system. At the moment, he does not know what he wants, but is leaning toward a medium-size mainframe rather than a mini — "something that will hold the company for a few years without the need for an upgrade," — because Nortron, which manufactures computerized wheel-balancing and wheel-alignment equipment for automobiles, is in a "tremendous growth mode."

Searching for Software

Patrick Schiemenz is a systems analyst and programmer with the U.S. Food and Drug Administration (FDA) in Rockville, Md., where an IBM 4341 was recently installed. He was here last week to look for "software we can put on it."

The 4341, installed to replace a 370/168, is being used for data base applications. Right now, the FDA is working on adapting its Computer Corp. of America Model 204 data base management system to run on it.

Distributed computing equipment and fund accounting software packages brought Dr. Roland Spaniol to NCC last week. Spaniol, who is director of Computer Services for Eastern Illinois University, wants to purchase all software and purchase it installed, because the university cannot afford to hire people to write it.

For Rudy Muravez, finance director for the city of San Luis Obispo, NCC provided an opportunity to see "peripherals that make our systems more useful."

For Charles Miles, a mechanical engineer at the U.S. Navy's Civil Engineering Labs in Port Hueneme, Calif., NCC was the place to see what new things are around. Last week he was looking at remote job entry equipment, disks and graphics terminals.

Minicomputers were the drawing card for Dennis Murphy, assistant controller for Marsteller, Inc., a Chicago-based advertising agency with offices all over the world. That firm now uses a 370/115 in Chicago to run media production and accounting applications and wants to distribute power to locations where there are only terminals at the moment.

Murphy's goal is to replace his keypunch data entry machines with small systems and he spent some time last week looking at Wang Laboratories, Inc. and Northern Telecom Systems Corp. DDP equipment.

Jack Cordaro, manager of systems development for Boeing Computer Services, Inc. in Wichita, Kan., came "to see what I could learn." He, too, is interested in network architecture for distributed systems and wanted to "find out what other people are doing." Boeing is a large IBM user with two 3033s and a 370/168.

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R.M. Gleisner, DP manager for Search Unlimited, a recruiting firm for professionals, came to NCC to see new terminals, packaged software and data communications equipment. With a five-person staff, packaged software makes more sense even though it takes more memory, he said.

Anthony Bucholtz, a programmer at Liverpool Hospital in Sydney, Australia, came for the technical sessions in medical imaging. He also spent some time looking at microprocessors for use in data acquisition.

Margaret Griffin, a programmer for Insurance Co. of North America in Los Angeles, came because she "likes to keep up on things" — and was interested primarily in the technical sessions.

Joanne Strauss, senior programmer/analyst for Northrop Corp. of Hawthorne, Calif., came to attend several specific sessions, particularly those dealing with management — a direction in which she sees herself heading.

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NCC '80

A Photo Feature
By Ann Dooley

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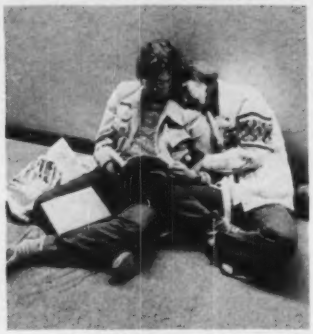

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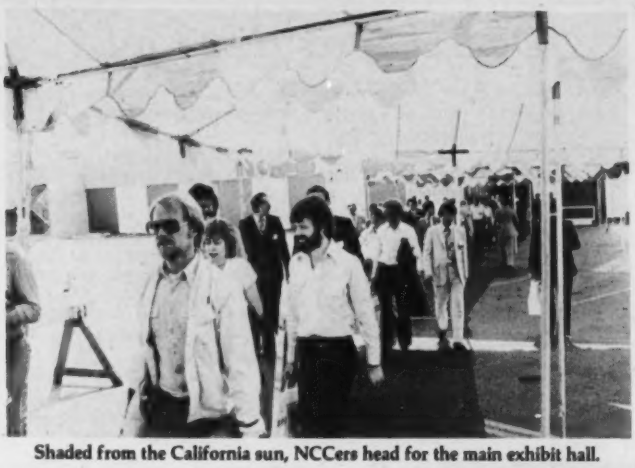

Shaded from the California sun, NCCers head for the main exhibit hall.

A standing-room-only crowd greeted NCC keynoter David Packard.

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Photo by V. Farmer and H. Fling

Software Methods Offered To Close User-Designer Gap

By John Whitmarsh
CW Staff

ANAHEIM, Calif. — "Hybridized" software methodologies that rely on greater user involvement may be the next step in closing the distance between the kind of system an end user specifies and what the software engineer designs.

That is the thinking of Lawrence J. Peters, senior staff consultant with Yourdon, Inc., who addressed a packed session on user requirements and software specifications at the National Computer Conference here.

The dichotomy between requirements definition and system design has been a continuing problem in software development. Approaches taken to solve it have ranged from increased formalism in requirements definition to iterative derivation of requirements through prototype development and review, he said.

Heart of Problem

While the various approaches have their commonalities and differences, none strike at the heart of the problem.

"The real issue of requirements vs. design is to define the problem before defining the model of the solution," Peters told the audience.

While the two steps in the software life cycle may be separate processes, "there is a parallel between defining requirements and designing software" that may allow more feedback and participation by user and designer in both stages, Peters said.

Modeling is a communications aid which, because it deals in abstract concepts without minute details, can open the channels of discussion between user and designer, Peters suggested.

Modeling also serves to reduce the odds of a collision between user realities and engineer realities. For example, the user may be concerned with customer satisfaction while the engineer worries about programming languages. The user may look only at the overhead of the system, while the engineer concentrates on its cost. The function of the model, Peters said, is to bring the two camps together.

User in Driver's Seat

Hybridized life cycles are "meant to increase user participation — to put the user in the driver's seat as development progresses," Peters said.

Because hybridized methodologies put the customer and the contractor on the same team, they have distinct advantages over the "classic" software life cycle. In the classic cycle, specifications of the end users were set down and signed off before design began.

"But this meant that all the user saw was documents until very late in the game," Peters explained. "He may have read about his new system but, as with buying a new car, he had not 'driven' it."

Hybridized life cycles not only increase user participation and put user and designer on the same team, but they also have a third advantage.

"They're psychologically advantageous. By involving the user wherever possible, this helps make it 'his' system instead of 'my' system."

Hybrid methodology draws heavily on elements of existing techniques and methods plus "customized" features. A key ingredient is the incorporation of design methods into the analysis/-

CW at NCC

specification phase.

Because hybridized life cycles depend heavily on prototyping and the respecification and redesign of the system with the user, they have two advantages over the classic life cycle. First, Peters said, "feedback from the customer comes very early in the hybrid methodologies and second, prototype development also appears very early."

Do Bad Specs Hike Costs?

ANAHEIM, Calif. — Do faulty original specifications of a system contribute to higher software maintenance charges?

Probably not, according to E. Burton Swanson, assistant professor at the University of California at Los Angeles graduate school of management.

Swanson presented the results of his just-completed three-year study of applications software maintenance to a user requirements and software specifications seminar at the National Computer Conference.

Swanson surveyed 2,000 DP managers. From 487 respondents here's what he found:

- Maintenance consumes 49% of the total software applications effort among respondents vs. 43% for new systems development.
- Most software maintenance fell into one of three classes: corrective (in response to a failure of any kind); adaptive (in anticipation of potential failure); perfective (refining the system for efficiency or user enhancements).
- About 51% of the maintenance effort was spent on perfective procedures, 24% went for adaptive measures and 22% was for corrective maintenance.

Based on his findings, Swanson concluded that "user demand for enhancements and extensions (as opposed to faulty original specifications) is the most significant problem in software maintenance."

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Software Engineer Training Programs Urged

By Brad Schultz
CW Staff

ANAHEIM, Calif. — The U.S. needs more software engineers, but is only beginning to train them in formal university curricula, according to speakers at a National Computer Conference session here last week.

The DP community still argues about what "software engineering" means, but the term is usually applied to the study and practice of developing computer programs as efficiently and effectively as possible. Some of the nation's universities have started offering courses in the subject, usually under the aegis of the computer science department.

But software engineering is not really an area of computer science, according to Walter Karplus, a professor of computer science at the University of California at Los Angeles. And many computer scientists want no part of curricula that present methods of solving mundane DP problems irrelevant to their particular research interests.

TRW-UCLA Venture

Several schools have turned to private industry for help in training software engineers, such as the joint venture by TRW, Inc.'s Space and Defense Systems Group with UCLA.

Panelist Josh Hurvitz, who administers the project for the aerospace firm, said the two-year program is offered to the TRW division's entire professional staff, although applications are approved on a selective basis.

Under the program, TRW employees work half-time for the Redondo Beach, Calif., company and study

CW at NCC

half-time at UCLA's Computer Science Department through the regular academic year. They work full-time during the summer.

The program culminates in the awarding of a master's degree in computer science, although the coursework is addressed to software engineering rather than theoretical subjects. According to Hurvitz, participants usually stay with TRW after completing similar fellowship programs the firm has offered. However, this program has just begun, and attrition estimates are premature, he said.

When the first cycle of software engineering education is completed next year, most graduates will probably return to full-time employment at TRW as leaders of project teams or entire development projects, Hurvitz predicted.

Is TRW worried about losing the software engineers whose education is subsidized under the program? Hurvitz indicated that graduates are expected to enrich the firm's stock of expertise and capacity for innovation.

At any rate, legal contracts requiring the graduates to stay with TRW for a specified period would probably be harmful, the corporate training manager said. The rookie software engineers would not be very productive if a contract was all that kept them from jumping to other employers, he speculated.

Harvey Mudd Program

Harvey Mudd College trains software engineers by soliciting jobs from private industry and government, according to Stavros Busenberg, the mathematics professor who administers the Claremont, Calif., college's work/study program.

Harvey Mudd students get class credits for their efforts, which help the sponsoring organizations develop software systems for their own purposes, Busenberg said. The companies and agencies must pay the costs incurred by the college, but do not pay the students.

Only a few software-related projects are now under way. Most of the projects, which normally must be completed within an academic year, involve other technical disciplines.

The Harvey Mudd program and most other software engineering programs at U.S. universities demand proficiency in technical writing and other skills, such as public speaking.

According to UCLA's Karplus, the training of software engineers bears little resemblance to the training of the well-established categories of engineer.

Mechanical and electrical engineers generally study fundamental subjects in mathematics and the natural sciences before proceeding to applied sciences and finally to the technology they will employ as professionals, Karplus pointed out. This approach tends to grind out creativity in the student, the computer scientist asserted, and rewards compliance with fairly rigid methodologies.

In contrast, freshman and sophomore computer science students usually combine a wider range of nontechnical subjects with subjects related to their majors, Karplus observed. At that level, the students are typically involved with learning algorithms.

Thus, mechanical and electrical engineering students follow a pyramidal route toward their professional objectives. In contrast, software engineers take an inverted pyramidal course, starting with slow commitment to technology and increasing that commitment steadily with time.

As a result, today's computing students generally have far more liberty in structuring their involvement with technology than students in other technical disciplines, Karplus said.

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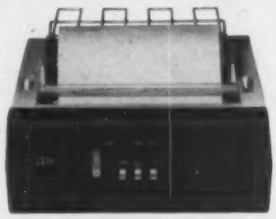

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Semantic Integrity Seen Step to End 'Garbage' In Distributed Data Bases

By Marcy Rosenberg
CW Staff

ANAHEIM, Calif. — Data errors in 20% of the Social Security Administration's files resulted in unfair payments or failures to pay.

Similarly, 20% of Internal Revenue Service records contained data errors of some kind.

And the New York Legal Aid Service, which prepares criminal records, reported that only 27% of its files were correct.

Speaking at the National Computer Conference here last week, computer scientist Elizabeth N. Fong threw out these statistics to hammer home a point: "Garbage in, garbage out" becomes "garbage in, garbage stay" when adequate controls are not in place to ensure that data within a data base is logically correct.

A step in the right direction is to develop data base semantic integrity, according to Fong, employed by the National Bureau of Standards' (NBS) Institute for Computer Sciences and Technology, which is building an Experimental Semantic Integrity System. (Xsis).

Because semantic integrity is concerned with the logical meaning of data, it helps control three sources of data errors in a data base management system (DBMS): incorrect entry, system failure and, to a greater extent, conflicts with the intended meaning of the data, according to Fong. This latter problem occurs when the perceived interrelationship among DBMS data is violated.

By specifying value ranges, for example, semantic integrity could detect the error in entering a person's weight as 570 kilograms instead of 70 kilograms, she explained.

The goal of semantic integrity, then, is to begin with a clean — semantically correct and, therefore, logically correct — data base and make sure that subsequent updates also result in a clean data base.

This goal remains an elusive one, Fong admitted. The reasons? Individual updates may involve operations across data structures, may require several statements of the data manipulation language and may involve logically interrelated data.

Further complicating the matter is the fact that the understood meaning of data is usually not formally expressed.

Approaches to Integrity

Nevertheless, different approaches to semantic integrity have surfaced, although most have trade-offs. The two primary methods, an assertion-based approach and data type checking, are no exceptions, Fong noted.

Since the assertion-based approach allows users to specify those semantic integrity rules that seem important, it offers the advantage of incorporating semantic integrity capability on an incremental basis.

But the disadvantages of this approach are threefold, according to Fong. First, it cannot determine how complete a set of rules is since there is no basic point of reference; second, it opens up the possibility that adding a new rule will show that a data base previously thought to be semantically correct now suffers from integrity violations; and third, it involves significant overhead by requiring that consistency checks on the collection of

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rules be incorporated.

The advantage of data type checking, Fong said, is that strong data types are constructed from system data types, thus allowing type interrelationships to be formally specified through aggregation and generalization. Such specification permits semantic integrity assertions to be checked statistically at compile time rather than at runtime and can show how complete and consistent the data type specifications are.

On the other side of the coin, this approach requires complete specification, a major effort when talking about significantly large data bases, Fong said. Another drawback is that semantic integrity requirements which are value- rather than type-oriented cannot be specified.

Combination Approach

A combination of the two approaches may prove to be a better semantic integrity system, Fong maintained. To implement such a combined method, however, requires three components — rules specifying both type- and value-oriented semantic integrity constraints, a process for checking conformance with these rules and the actions which should occur when integrity violations are detected.

This method, in theory at least, would be structured to provide semantic integrity while supporting uniform access to multiple, remote, heterogeneous DBMS, according to Fong.

Enter Xsis, the prototype semantic integrity system NBS is developing. Its design is intended to blend both the assertion-based and strong data type approaches to semantic integrity.

Xsis is designed to operate as part of a distributed network environment supporting different multiple and remote DBMS provided by an Experimental Network Data Manager (XNDM). Both Xsis and XNDM are implemented in C language on a Digital Equipment Corp. PDP-11/45 attached to Arpanet and running Bell's Unix operating system.

The intent is for Xsis to act as a filter for checking remote data base operations expressed via XNDM's experimental Data Language (XNDL), remarked Fong, who is participating in its development. Xsis, which views semantic integrity as a system rather than as user responsibility, consists of two components. One supports constraint specification and maintenance; the other supports constraint evaluation and enforcement.

Asked about the overhead that would be associated with gaining semantic integrity, Fong said it could be "very large." She admitted users may have to trade off performance for integrity.

Information Technology to Shape Decade: Imlay

By John Whitmarsh
CW Staff

ANAHEIM, Calif. — The technological achievements of the past may belong to the space and medical industries, but the decade of the 1980s belongs to information technology, according to John Imlay, chief executive officer of Management Science America, Inc. (MSA).

Imlay, who steered MSA from the brink of financial ruin and transformed it into one of the largest software developers in the world, urged his luncheon audience here to forget the concept of computing as they have known it.

"We are no longer in computing. It is no longer DP. It is information technology, and it is the brightest industry of the '80s, brighter even than energy," Imlay declared.

Areas of Promise

The forces promising a bright future in information technology are already in place in six areas, Imlay said:

• *Manufacturing.* IBM has led the field in computer manufacturing, but of late the industry giant has encountered problems of cash flow and unreliable software development.

Problems of cash flow generated by users switching from purchase to lease of IBM equipment are temporary and will be solved by the mid-1980s, but the problem of unreliable software — "the System/38 was a miserable software failure" — will plague IBM through much of this decade.

• *Acquisition of computer service companies.* The trend began in the waning years of the '70s, but is expected to accelerate in the '80s. Ten computer service companies already top $100 million in revenues.

Acquisitions such as the purchase of National CSS, Inc. by Dun & Bradstreet for $163 million in cash and the acquisition of Data Resources, Inc. by McGraw-Hill, Inc. for $103 million are but two examples of the acquisition activity expected in the immediate future by large corporations on the acquisition kick.

• *Communications.* "Here's the biggest revolution in our industry," Imlay said, and it will include everything from fiber optics to earth stations.

One indication of the future was the recent announcement of a joint venture by Communications Satellite Corp. and Sears Roebuck & Co. to market a 9-in. dish antenna to communicate with satellites whirling around the earth from home or office. Cost of the new dish: $350.

But the communications revolution will receive its major impetus from the looming battle between IBM and AT&T. When prices for communications services and equipment begin to plummet from competition between the two companies, the revolutionary spark will have been kindled, Imlay forecast.

• *Word processing.* It's only in its infancy, according to Imlay. As the forerunner of the office automation revolution, WP will be tied to central computers and will be a major responsibility of DP managers, Imlay predicted, hinting that control of both WP and DP should remain in the DP manager's camp.

The world of WP will be wracked by two other trends. First, Imlay predicted that "word processing companies by the end of the decade will turn into minicomputer companies as the office automates and every desk houses a minicomputer."

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Second, Imlay emphasized, Exxon Information Systems will emerge as a key influence in the direction of the office of the future.

• *Personal computers.* Homes will open their doors to personal computers in the '80s. Only three personal computer companies are now on the scene, but by the end of this decade more than 100 personal computer manufacturers will vie for the attention of home users.

Entrance into the home will be eased by young children who, in contrast to their parents, know no fear of the computer. And this new generation of children nurtured on the computer may hold some promise for the personnel problems of the '80s and beyond, Imlay intimated.

• *Software.* The accent of the '80s is on software and its effective application to business problems. Over 750 companies now sell software packages, and their combined revenue this year will top $1 billion, Imlay believes. The number of software offerings alone has increased from 398 in 1968 to 5,116 last year, Imlay noted.

CW Photo by A. Dooley

MSA President John Imlay

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Study: It's Not Money That Motivates DPers

By Bruce Hoard
CW Staff

ANAHEIM, Calif. — Social studies show that DPers exhibit unique psychological characteristics that set their motivational needs apart from workers in any other profession, panelists at the National Computer Conference said here last week.

Dr. J. Daniel Couger, professor of computer and management sciences at the University of Colorado, and his colleague, Dr. Robert J. Zawacki, assistant dean of the school's College of Business, found in a study they conducted over the past three years that DPers have extremely high "employee growth need strength" and extremely low "social need strength."

Those two categories represent only two of several they used to detail the motivational needs in a DP industry currently experiencing what Zawacki labeled "28% to 30% turnover rate."

That high rate and the nose-diving productivity associated with it were the main reasons Couger and Zawacki, who have co-authored a book entitled *Management and Motivation of Computer Personnel*, decided to conduct their study. Working from a data base of 6,000 DPers representing a cross-section of industry employees, they concluded that job dissatisfaction resulting from insufficient motivation is eviscerating the DP ranks.

"The motivational concept is hard to talk about," Zawacki said. "You can't taste it, you can't feel it and you can't smell it. In addition, like most concepts, it is a controversial thing."

Real Reasons

The academician debunked the idea that salary is at the root of employee turnover, attributing it instead to failure to pay proper attention to the "hygienic factors" originally developed by MIT social scientist Fred Herzberg in the mid-1950s. Those factors take into consideration such psychological factors as achievement, advancement and recognition, Zawacki said, claiming it is these factors — not money — that most deeply concern workers.

He identified five "core job dimensions" that parallel the hygienic factors principle. They are skill variety, task identification, task significance, autonomy and feedback.

Couger advised that "supervisors should look at each of these five and ask, 'What can we do to enhance job positions?' "

Skill variety refers to the different tasks a worker performs in his daily duties, Couger explained, suggesting that programmers mired in maintenance be given more training to make them feel as though they are working toward better positions.

Task Identity

Task identity is the ability of workers to relate to the wholeness of a project on which they are working. A computer operator would feel a much stronger task identity if he were periodically visited and briefed by a design team that could portray his role in the total operation, Couger pointed out.

How a worker and his coworkers feel about his job constitutes task significance. Data entry people would be motivated if users were occasionally brought in to talk about the impact and importance of their work.

"People want and demand challenges and goals," Couger said of autonomy. "They also want to set deadlines on projects and then work toward them under their own supervision."

In a typical case, an analyst might discuss long-range plans with his supervisor, Couger said.

The last core job dimension, feedback, is sorely lacking in many DP operations, Couger said. If performance standards were established for data entry and control people, their productivity would increase sharply, he argued.

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Women Managers' Concerns Dominate Discussion On 'Change Management'

By Rita Shoor
CW Staff

ANAHEIM, Calif. — The session was titled "Change Management" with "Woman in DP" listed as the subtitle. But from the reactions of the attendees to the discussion which took place in the latter portion of the session, change management took a definite second place to the concern over problems of women in DP management positions.

"Many of the more blatant forms of prejudice [against women] have been diminished," Ida Mason, professor of business information systems at Lehigh University, told the National Computer Conference session here last week. However, women can only manage change effectively for their own benefit and that of their organizations if they keep in mind the "realities of society" and some problems caused by their own attitudes.

Among the factors mentioned as affecting women in management were problems with traveling alone in a large city, the pairing of men and women for business trips and the problems of relocation for promotion if it means that a husband will lose his job.

Among women's attitudinal problems, according to Mason, they frequently attribute another woman's success to luck rather than ability and women tend to have a higher opinion of a man's work than identical work performed by another woman.

Female managers tend to hire males, Mason said. "It's something like IBM — it's a safe route."

Problems of Relocation

At this point, session leader Lorri Pitchell from Burroughs Corp. posed the question of promoting married women to positions that would involve relocating their families. She addressed the question to both Mason and Al Orsava, executive director of information systems for the municipality of metropolitan Toronto.

Orsava, who served as "devil's advocate" and took the negative position during the discussion, stated that special considerations must be made for women when considering relocation. The age of a woman, whether or not she has children and how long she has been married are definite factors which might affect a move, he said.

"Women think of themselves as managers only during working hours," he continued. "A man lives to work, while a woman works to live." He said he would only offer a job involving relocation to a woman if she came up with the right answers to these questions.

One session attendee objected to this strongly and pointed out that she had moved her family twice in order to advance her career. "My spouse is smart enough to find another job," she said, "and I'm willing to accept a temporary decrease in income if necessary."

Both Mason and Orsava agreed that this woman was in the minority and, Orsava continued, "remember that it's only in the last 20 years that women have become a major factor in the work force. It is their responsibility to implement attitude changes because they are the new factor."

When another member of the audience said that she was "horrified at what's been said" and continued with the recommendation that everyone work on changing their perceptions,

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Orsava answered, "Maybe I'm just more honest than other managers."

Pitchell then reminded the audience that Orsava had been invited to take part in the session in order to take the negative viewpoint towards women in DP management. Additional questions such as the difficulties women in upper management have in handling other women and the need for women to "play by the rules" were discussed in a relatively calm atmosphere.

Need for Formal Approach

No questions were asked about the first part of the session, which dealt with the need for a formal approach to change management within both small work groups and the organizational structure as a whole. Pitchell pointed out this need when she stated that "one out of every three changes [implemented within an organization] fail."

Reasons for this failure when applied to implementing DP systems, she said, are:

- Frequent change of objectives or specifications (50%).
- Lack of communication between user and DP departments (25%).
- Inexperienced management (15%).
- Other (10%).

Cost and time overruns in developing the system, inadequate cost/benefit analysis and poorly assigned project priorities that do not reflect organizational goals are among the sources to which an unsuccessful change can be traced, according to Pitchell.

Three-Phase Process

Dynamics of the change process fall into three phases, characterized by Pitchell as "unfreeze, change and refreeze." The unfreeze stage is necessary because "change is initially perceived as threatening; any change will be opposed by a supervisor or by a worker unless he requested it." Pitchell quoted Kurt Lewin, coauthor of *Model of Change*, who wrote: "Any organization is unlikely to change unless it is hurting in some way."

Pitchell listed several techniques that might prove helpful in overcoming resistance to change:

- Taking into account the needs and attitudes of the people involved in the change.
- Identifying the managers with the greatest prestige and getting them to be advocates of the new system.
- Increasing the sense of group identity between people who would be affected by the change (users) and the "change agents" (DP personnel).
- Keeping communications open between user and technical departments.

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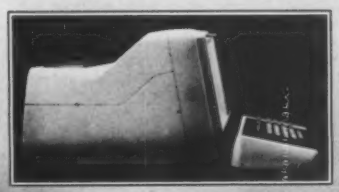

DP Seen Political Aid in U.S., Threat in USSR

By Brad Schultz
CW Staff

ANAHEIM, Calif. — Computer technology helps U.S. public officials stay in power, but largely threatens the Soviet Union's political structure, according to panelists at a National Computer Conference session here last week.

U.S. government administrators often wield on-line data bases and other trappings of the technology as political weapons, Prof. William H. Dutton told the session on computing's "social dynamic." Systems give credence to policy decisions, the University of Southern California scientist explained, when they generate analysis to support decisions already made.

Of course, a U.S. policymaker likes to say that the analysis preceded the decision and refuted alternative points of view, Dutton observed.

But computer technology undermines the far more centralized and bureaucratic political structure of the So-

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viet Union, University of Virginia Prof. Seymour Goodman pointed out. In that country, top officials may lose considerable power if they let systems proliferate, giving lower level officials and professional people an unprecedented capacity for storing and manipulating data.

Systems tend to leave audit trails, which would embarrass lower level Soviet DPers, who often must break laws to acquire the resources they demand, Goodman said.

Support for Power

Computing power entails political power, the panelists agreed. In that respect, citizens' groups opposed to government policies are at a disadvantage if they lack systems to support their dissent, Dutton remarked.

Government agencies resist sharing of data, even when they join on-line networks, MIT Prof. Peter Keen noted. Data sharing generally becomes a question of competence, he said. Where two agencies see each other as equally competent, a "truce" may be arranged to permit mutual access rights.

But an agency usually does not give data base accessibility to another agency it considers less competent as an evaluator of the information, Keen declared.

Agencies frequently squabble over interpretations of data, he said. The Texas public school districts have reportedly argued for years about how to define student absences, making computer records of student attendance useless.

Questions of Productivity

Besides the incentive to enhance political clout within an organization, U.S. DPers acquire systems to enhance the organization's productivity. But enhanced productivity is less attractive to Soviet DPers under certain circumstances, Goodman maintained.

Ironically, that is because most Soviet organizations are committed to filling production quotas, the University of Virginia scientist explained. The quotas are set annually on the basis of the previous year's output, he said. By drastically improving productivity through a major upgrade of computing facilities, a Soviet user would bind itself to far greater quotas for subsequent years.

Nevertheless, top Soviet officials are trying hard to raise the nation's output of goods and services, Goodman continued. Slow growth in white-collar productivity, which afflicts the U.S., is especially bad in the vast Soviet bureaucracy, he said.

Resolving the Problem

To resolve the problem, the Soviet Union has developed a number of computer systems patterned after U.S. models.

According to Goodman, the Soviets have successfully imitated IBM 360 and 370 mainframes, Hewlett-Packard Co.'s 2000 series minicomputers, members of Digital Equipment Corp.'s PDP-11 mini family, Intel Corp.'s 8080 microprocessor and the 6800 microprocessor from Motorola Corp.

The Soviets probably committed more capital to developing a replica of 360 operating systems than IBM did in turning out the originals, Goodman stated.

Systems Incompatibility

Although the Soviet Union is "arguably" the world's second largest computer manufacturer and has the strongest national contingent of mathematically oriented engineers, the software packages produced at central development plants seldom seem to reach a large portion of the nation's user base, Goodman observed.

The most likely explanation, he said, is systems incompatibility. The central plants may lose touch with the users, which are less able to meet with them and each other than are their U.S. counterparts. With far less vendor-user feedback, the Soviet DP community probably resorts to more independent systems "tinkering" when problems arise than does the U.S. community.

In response to a question from the session audience, Goodman said the U.S. intelligence community bears the closest resemblance to the Soviet users he described.

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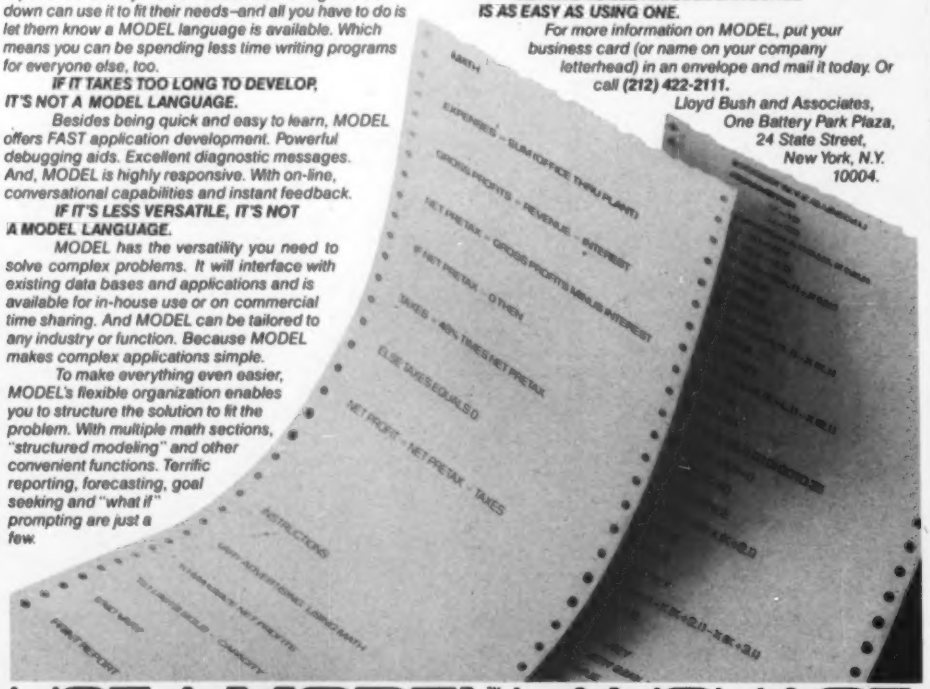

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Plan Predicts Viability Of DDP Configurations

By Tom Henkel
CW Staff

ANAHEIM, Calif. — The network configuration of a distributed data processing (DDP) system has a direct impact on how well a given system will fare when hit with a problem, according to researchers who spoke here at the National Computer Conference last week.

The survivability of such systems is being roughly predicted by means of a rudimentary mathematical formula developed by Richard Merwin, of the Department of Electrical Engineering and Computer Science at George Washington University, and Gene Hilborn, supervisor of advanced network planning for the Ford Aerospace and Communication Corp.

Merwin and Hilborn, who appeared on a panel here last week, said the plan may be the first step toward developing computerized analysis of the survivability of distributed systems.

Presented by Merwin and backed up by theory prepared by Hilborn, the plan rates DDP networks by their likelihood to create severe problems if one or more of the individual pieces of the network, or nodes, are eliminated. The program, prepared in PL/I and run on an IBM 3031, evaluates network configurations and rates them between zero and one. The more closely the evaluation approaches one, the stronger that system will be if parts of it should fail.

Maximizing Survivability

While admitting their research is still in the early stages, both Merwin and Hilborn said perfection of the computer analysis process could help users optimize costs in designing distributed systems.

The ideal, or "complete," distributed system is one in which each node is linked via a telecommunications network to all the other nodes in the system. Since the complete system would also be the most expensive in terms of telecommunications costs, not all users would want an all-nodes-linked type of system.

The challenge is to maximize a distributed system's survivability. Aside from the complete system, the most survivable type of configuration was a grid-type pattern that linked nodes vertically and horizontally. That configuration was further enhanced when a diagonal link was added, Merwin said.

Other strong configurations included a semigrid pattern, where the center node in a nine-node box was linked to three outer nodes. That configuration received a .63 rating from Merwin's program while a somewhat weaker version of the same idea received a .601. In the latter configuration, the center node was connected to the outer ring of nodes by one link.

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A swastika pattern received a .553 rating, and a weaker version of that configuration, a Z-shaped pattern, received a .49 rating, Merwin said.

A star-shaped configuration, in which all nodes had a single link to a central node, received a strong .632 rating. However, the Merwin program did not evaluate the system's vulnerability if the center node were eliminated.

The weakest type of distributed configuration was one where all nodes were linked in a straight line. Merwin explained that if one node were eliminated, the system would be divided into two subsystems. If vital programs or data were stored in one end of a straight-line system, one or both subsystems could be rendered useless, Merwin added.

Although the Merwin program — which he developed with Mohammed Mirhakak, a graduate student at George Washington University — made some headway toward computerized analysis of distributed networks, it also appeared to have some flaws.

The program did not take into account the importance of data or programs stored at an individual node. All nodes were treated as having equal importance, a concept that is not always carried out in real distributed systems, members of the audience pointed out.

A similar argument could be applied to Merwin's rating system. A strong configuration with a vital node eliminated could be more severely debilitated than a weaker configuration with several nodes of lesser importance eliminated, a member of the audience noted.

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Development of Ada Gets Mixed Reviews

By Phil Hirsch
CW Washington Bureau

ANAHEIM, Calif. — Whether the development of programming language Ada is being adequately coordinated was the underlying topic of a panel discussion here last week at the National Computer Conference.

Ada is named after the world's first computer programmer, Lady Ada Lovelace, friend of Charles Babbage. Under development since 1975 by the Defense Department's Advanced Research Projects Agency (Arpa) as well as other U.S. and allied military agencies, Ada is expected to become the standard language used by all Nato nations for weapons system control, command and control and related applications.

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Honeywell, Inc., which supplied the computer systems for the Defense Department's much-criticized World-wide Military Command and Control System — better known as "Wimmex" — recently won the contract to design the final version of the language, subject to specifications which the U.S. and allied development group has just about finished drafting.

Meanwhile, a group within the American National Standards Institute is considering development of a commercial Ada standard. Communications protocol implementation is one likely application. Intel Corp. reportedly is supporting Ada in its new microprocessor series.

The chief critic of the Ada development process at last week's NCC session was Dudrey C. Smith of Lear-Siegler, Inc. He suggested that the language is in danger of falling prey to the same infirmities that have beset Jovial (J3). Next June, Smith pointed out, J3 becomes the standard Air Force programming language, even though no standard, validated J3 compiler is yet available.

Users, as a result, will have to go through a cumbersome process of obtaining waivers allowing them to use prestandardized J3 compilers or other languages; the only other alternative, he added, is to delay pending procurements until a validated J3 compiler becomes available.

In the case of Ada, Smith said, the deadline for adoption of the language does not allow enough time for development, testing and validation of the compiler, text editors, debugging routines, and other environmental support. "It's an over-ambitious development schedule," he contended. "They're pushing the implementors too hard."

Smith also said the three military services should develop a standard procurement specification for Ada, pointing out that both the Air Force and Army have issued procurement requests for Ada compilers that differ markedly.

'Rich' Support

However, Dr. William E. Carlson, who heads the Arpa project team that helped develop Ada, said the Defense Department is planning to spend enough money on Ada to assure a "rich" support environment. He stressed that the validation requirement for all Ada compilers will assure not only that all the required features are present, but also that nonstandard features are omitted.

Once the Ada standard is promulgated, a "language control board" composed of representatives from all the participating military agencies will provide standardized solutions to disputes and adopt standard modifications as they are needed.

The basic goal of the Ada project, Carlson added, is to end the proliferaton of special-purpose military programming languages. Their incompatibilities and obsolescence have created serious operational problems and unnecessary software expenditure; a big part of both problems is that most programmers are not familiar with any of these special languages, Carlson added.

Another Ada developer, Dr. Robert Firth of the British Royal Military College of Science, pointed out that in the course of the project, more than 600 papers commenting on various aspects of the proposed standard were received and analyzed and more than 200 written responses were sent back. There were literally thousands of informal conversations between the developers and the interested parties, plus "two or three" reviews of various chapters of the proposed standard, he added.

As a result, the latest version of the specification differs in many respects from its immediate predecessor. Most of the changes involve the sections on generic capability, separate compilation, testing and private types.

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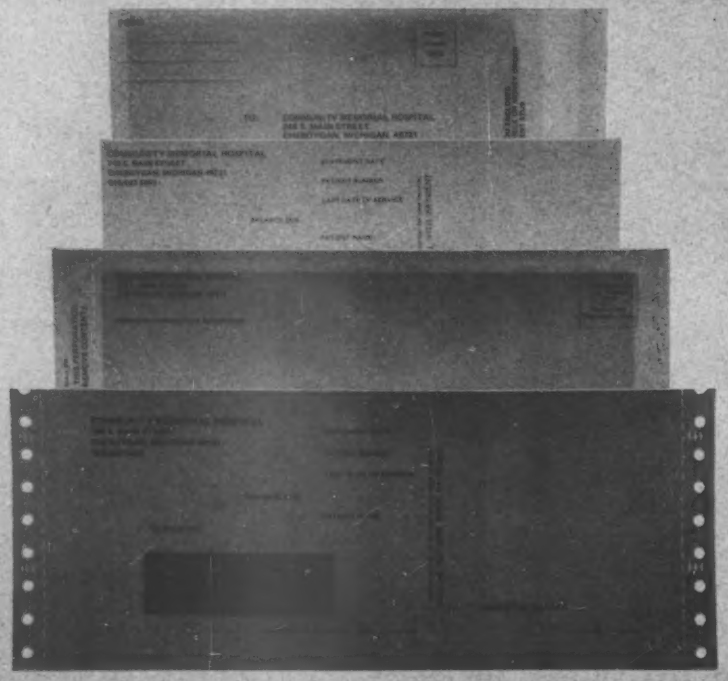

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Maintain Lead in Research Or Lose Role as Leader, Packard Tells U.S. Industry

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. — The U.S. computer industry must continue to lead the world in the basic computer technology if it is to maintain its world leadership position.

"Japan and several other countries are increasing their research and development in computer technology, and if they gain a significant advantage in any area of technology important to future computer development, it could become a serious matter for our industry," David Packard, the chairman of Hewlett-Packard Co., warned.

More than 3,000 people crammed into a conference hall at the convention center here to listen to Packard's keynote address, which officially opened the National Computer Conference last week.

Funding Basic Research

Aside from serious rumblings from Japan, foreign competition, in Packard's opinion, is not the principle threat facing continued U.S. technological leadership.

Rather, he decried the lack of contribution by smaller firms toward research of basic industry technologies. "Much of the basic research in this country is being done in the laboratories of a few of the larger companies, notably Bell Labs and IBM," Packard noted.

Moreover, the availability of highly educated and skilled people will be a major determinant of progress in computer technology in the decade ahead, he added.

While Packard acknowledged that smaller firms can seldom justify investing in basic research, he repeatedly stressed the important role these companies can play in the development of technology through financial support of university research.

"I would encourage every firm in this industry to find some good university research program where work is being done in technology relevant to your company's interest and try to help ac-

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celerate this work with more financial support," the HP chief urged.

By cementing relationships with universities, companies will help create the environment necessary to attract the dwindling pool of talent to the study of computer sciences. A supplementary benefit is that many of these students may opt to work for companies supporting the research.

The decline in the birthrate will reduce by 21% the number of youths between 18 and 24 by 1995, he pointed out, emphasizing the seriousness of the shortage of talent.

But support cannot stop at the university level. Career patterns are often set at an early age, and if precollege education is inadequate, high school students will not qualify for the training they need to participate in a technologically lively industry.

"Young people seem to have an innate interest in computers, and whatever the industry can do to stimulate that interest could have a very large payoff in the future," Packard reasoned with the hindsight of approximately 50 years in the industry.

Industry and Government

Although some industry leaders have called for government support of basic technology research, Packard thinks this is unwise. "An industry environment that nurtures creativity and productivity is essential. The industry has generally enjoyed such an environment over the last several decades because there have been few government restraints."

Ironically, despite suggesting that industry avoid letting government solve its problems, Packard sees chief executive officers in computer firms spending more and more of their time on government relations during this decade. Packard advised executives it is in their best interest to work closely with government lest they sacrifice the creative environment that has been established over the past decades.

Without infringing on private industry, government can spur creativity by providing incentives for capital investment and rewards for innovation.

The reduction of the capital gains tax last year has already stimulated the amount of risk capital available, Packard said. He is also confident that Congress is receptive to returning to the old stock option rules, which imposed capital gains taxes on those exercising options when they sold stocks.

The present law levies taxes when the option is exercised.

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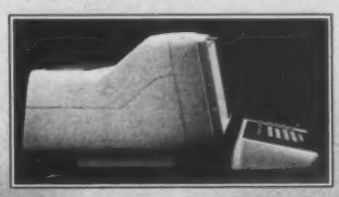

Distributed Data Base Design Goals Addressed

By Marcy Rosenberg
CW Staff

ANAHEIM, Calif. — Distributed data base architecture should meet two key objectives: maximize site autonomy and distribute information logically as well as physically.

The advantages of such a distributed data base system are twofold, according to panelists speaking on network data base access at the National Computer Conference here last week.

First, the system is potentially more efficient than a physically centralized data base system because the data can be placed close to where it is needed.

Second, if data is needed at two or more locations, it can be duplicated, creating a potentially more reliable distributed data base system than a physically centralized data base because if one computer fails, others in the network can continue to operate.

While current research on distributed data bases aims to provide techniques

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that support the physical distribution of data items in a computer network environment, these approaches require a distributed data base to be logically centralized.

Dr. Dennis McLeod, assistant professor of the Computer Science Department at the University of Southern California in Los Angeles, stated a case for logical decentralization.

Discussing the limitations of the integrated data base — where there is complete centralization at the logical level — McLeod pointed out that it is often difficult to integrate completely applications that are related, yet separate.

Further, he said integration may go too far in tightly coupling together aggregates of data that should retain some individual autonomy.

Federated Data Base

An alternative approach presented by McLeod involves what he termed federated data bases, which he claimd strikes a compromise between total integration, or centralization, and the disorganization of completely diffused, or decentralized, data bases.

A federated data base consists of a number of logical components, each with its own logical/conceptual schema, called a component schema. Typically, a component of a federation corresponds to a collection of information needed by a particular application or set of closely related applications.

What ties all components in a federation together is one or more federal schemata that are used to specify the information that can be shared by the federation components, and to provide a common basis for communication.

Issuing Transactions

In the federated approach, data base system users and application programs manipulate a data base by issuing transactions — that is, operations that retrieve information from or modify information in a data base.

Usually, a data base user or application program is affiliated with a single federation component and normally issues transactions that can be performed in the local component. McLeod called this property locality of reference.

When necessary, however, a user of one component can issue a transaction involving data that belongs to another component by consulting a federal schema to find the needed data.

The transaction involving nonlocal data is processed by issuing a request to a federal controller. Serving as coordinator and translator, the federal controller issues the necessary instruction to the other component to provide the data required.

Conflicts are resolved by what is called a federal data base administrator (DBA), which defines and controls all federal schemata, supplementing similar functions at the component level performed by component DBAs.

What this boils down to, McLeod said, is that the federated approach allows primary control over a data base component to reside with its principle maintainers and users, but also exercises centralized authority to ensure appropriate levels of sharing, data compatibility and data consistency.

Site Autonomy

Also desirable in distributed data base networks is site autonomy, according to Dr. Patricia Griffiths Selinger, manager of distributed data base systems at the IBM Research Division's Computer Science Department in San Jose, Calif.

While indicating that site autonomy is essential to maintain the efficiency and reliability that a distributed data base network can offer, Selinger noted that potential problems associated with site autonomy must be addressed.

For example, conflicts between compilation and authorization can arise if data from files at one site need to be merged with data from files at another site, and the local site is not authorized to access that data.

Ideally, Selinger said, site autonomy would permit descriptions of data to reside locally at the site that stores that data, with shared or replicated data stored at more than one site.

This "sounds wonderful," but can impact performance, she explained, pointing out that every time site A wants information about site B data, it has to access from site B. Her solution is to cache, or store, in site A frequently used site B data.

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For U.S Impact

Firms Warned to Track World Data Flow Laws

By Marguerite Zientara
CW Staff

ANAHEIM, Calif. — Although legislation governing transborder data flow has not yet heavily impacted U.S. and European business activities, nine foreign countries have passed laws that could soon cause serious problems for multinational U.S. firms.

That was the warning issued last week by Dr. Rein Turn, professor of computer science at California State University at Northbridge. Speaking at the National Computer Conference session, "Privacy Protection in Transborder Data Flow," Turn identified seven major problems associated with transborder data flow.

First, in a transnational DP system with multiple participants, the question of who controls and is responsible for what data is unclear, Turn noted. In addition, there are no international standards for dealing with the issue.

Third, existing agreements — for example, Malaga-Torremolines — allow countries to monitor and stop data transmissions, he noted. Furthermore, there is no uniformity in the laws against interception of communications.

As the fifth and sixth problems, Turn cited the lack of laws against computer crime, as well as the variations in the technical characteristics of transnational systems.

Finally, he said sovereignty concerns may prompt the keeping of data and processing in domestic systems.

Different Attitudes

Turn then emphasized that the U.S. and European countries have essentially different attitudes toward transborder data flow legislation. "While European nations will see a potential problem and pass legislation to deal with the eventuality," Turn said, "the U.S. will realize there is a problem here and now and then pass legislation to counter it."

In light of this and other essential differences between U.S. and European privacy protection attitudes, Turn suggested "it is important for U.S. enterprises involved in transborder data flow to convince the privacy protection authorities in the countries in which they operate of their commitment to privacy protection equal to the countries' own levels."

Throughout the 1970s, Austria, Canada, Denmark, the Federal Republic of Germany, France, Luxembourg, New Zealand, Norway and Sweden have passed privacy and data protection

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laws that are in varying stages of implementation, Turn said.

In the U.S., the Privacy Act of 1974, the Fair Credit Reporting Act of 1970, the Family Educational Rights and Privacy Act of 1974 and the Financial Privacy Act of 1978 are the federal laws in existence.

There are also five bills pending in the U.S. legislature and nine state privacy laws, none of which, however, is as comprehensive as the European laws, Turn indicated.

While the U.S. laws cover individuals and citizens, European legislation applies to all people regardless of citizenship. In addition, European laws ensure omnibus coverage, as opposed to U.S. area-by-area coverage.

Furthermore, Turn noted, European nations with such legislation also have licensing and regulatory commissions, whereas U.S. policy is largely that of self-enforcement.

On the other hand, "in order not to give a misleading picture of the level of privacy protection in the U.S.," Turn said, "it should be noted that the scope of U.S. privacy laws is broader. The laws apply also to manual systems, and private-sector privacy laws apply to all residents.

"More generally, the Constitution of the U.S. and those of the individual states place strong emphasis on openness in governmental decision-making processes and establish an atmosphere of concern for individual rights," Turn added.

"Practices such as establishing a universal identification number for each citizen or publishing the earnings and income of all citizens, as presently exist in Sweden, would not be acceptable to Americans," he noted.

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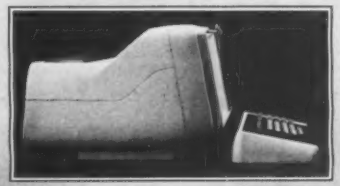

Different Expertise Demanded

'Retool' for Office of Future, Managers Advised

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — DP managers will have to "retool" their professional thinking and acquire new job skills to cope during the next 10 years with the burgeoning office-of-the-future movement, according to Johns-Manville Corp.'s telecommunications services manager, Dale Mullen.

The expertise that an office-of-the-future environment will demand from DP managers will differ sharply from the know-how such individuals learned as programmers or system analysts, Mullen said last week during a session at the National Computer Conference.

CW at NCC

To implement an office-of-the-future system successfully, DP managers will have to abandon their traditional role as mere technical specialists and increasingly master the skills of an effective "marketer," Mullen said. In other words, they will have to take the lead in deciding what automated office functions their companies should install and then have the ability to persuade their superiors those functions are necessary.

They will also have to cease serving as mere implementors of corporate policy and instead become full-fledged managers with a strong voice in their companies' key business decisions, Mullen said.

Unfortunately, he added, many DP managers are ill-equipped by training to exercise the leadership and accept the increased responsibility that office-of-the-future systems will soon thrust upon them.

Mullens' comments came during an opening-day NCC technical session entitled "Management of Information Technologies in the '80s." Other panelists taking part in the seminar included Thomas Cross, communications director for the Communications Institute of Boulder (Colo.), and session chairman Frank Kline, vice-president of research for Drexel-Burnham-Lambert, Inc.

'Live the Dream'

Continuing with his remarks, Mullen told an audience of several hundred DP managers and others that the emergence of office-of-the-future systems will force DPers "to live the impossible dream."

They and they alone, he said, will bear the responsibility for deciding the modules of which an office-of-the-future system should consist and the standards which should be developed to integrate those modules.

No individual can reasonably be expected to accomplish such a feat singlehandedly, but DP managers will have to do the job anyway. They literally have no choice in the matter. Automated office systems are inevitable during the coming decade, and if the most computer-literate member of an organization can't implement such systems, who can? Mullen asked.

The answer is simple. If top corporate managers cannot automate their offices through their own in-house DP departments, they will simply import the needed services by installing microcomputers from outside hardware vendors, Mullen said.

The prospect of microcomputer proliferation in the typical business office prompted Mullen to conclude that corporate DP departments are likely in the future to be relegated to mere "operations centers," with the bulk of the applications work done by the users themselves.

CW Photos by A. Dooley

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Office of Future Called Boost to Productivity

By Bruce Hoard
CW Staff

ANAHEIM, Calif. — The office of the future will boost the production of white-collar workers, and many of its elements are available at low prices today, attendees at the National Computer Conference were told here last week.

"The office of the future has become a real buzzword, but it is closely linked with white-collar productivity," Carolyn Watteeuw of Office of the Future, Inc. said.

Because business executives, not clerical workers, make decisions that affect the future of companies, they should be provided with equipment they will use enthusiastically, she added.

Typing is currently the biggest barrier preventing executives from readily adopting such equipment, she said, adding "a terminal with well-designed, programmable function keys can be bought off the shelf for $2,000."

An entire office system can be bought for $10,000, Watteeuw said.

Sophisticated Tools

Although more sophisticated, voice-input systems will not be available "until 1985, realistically," a heuristic voice-input terminal can now be leased for $180 a month, Watteeuw said.

Another useful — but expensive — tool for the office of the future is the data base management system (DBMS), which Watteeuw claimed can eliminate the most prominent cause of incorrect data — human error.

A DBMS for intelligent terminals can download host computer tasks while ensuring previously unattainable data accuracy, she said.

Saying "you can really give the executives some toys to play with," Watteeuw strongly espoused the use of color terminals in automated offices.

Using color, executives can create variants and perform transanalysis, she said, adding that color coding can greatly facilitate the use of electronic mail by designating priority items to be sent.

Again, she noted, the drawback is cost. "You can spend up to $50,000 on a good system," she said. However, such systems may soon be available for as little as $3,000 or $4,000, she added.

'Active' Forms

"Active" forms will expedite transactions in the office of the future, Watteeuw claimed.

In the case of a large sale, the form would be summoned to a CRT screen prompted to notify pertinent departments within the company, such as accounting and production, of the details of the sale relating to them, she explained.

Active forms require a host with at least 256K bytes of main memory, are commercially available and are inexpensive to maintain once the programs are written, she said.

In the area of storage for image processing, floppy disks are insufficient and video disks, although not widely manufactured, are the most likely alternative, Watteeuw said.

CW at NCC

Future automated offices will provide management with a variety of computer services, from text editing to screen writing on a split screen, she said.

Those services will be programmed with high-level languages but accessible to users via non procedural, English-like languages that will promote system use, she noted.

Turning her attention to communications, Watteeuw said coaxial communications networks are feasible and advisable for large companies that are wiring entire buildings.

For those companies wishing to develop an "outside" system, she suggested the use of fiber optics.

"Communications is the backbone of office automation — not just hooking up to Telenet and sending electronic mail, but actual file transfer from host to host," she said.

Looking into the future, she predicted that by 1990, data, voice and image networks will all be combined as one corporate network capable of maximizing management efficiency.

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Before Accepting Financing

Entrepreneurs Told to Know Investor's Motives

By Marcia Blumenthal
CW Staff

ANAHEIM, Calif. — The entrepreneur with a better high-technology mousetrap had better mind which path he takes to the investor's door.

With venture capital firms now investing more than a billion dollars annually, it is important for the would-be entrepreneur to understand the investment philosophy of various venture capital organizations.

This was the view expressed by some panelists during a recent National Computer Conference session here on venture capital.

In particular, the fledgling entrepreneur should be aware of the difference between the motivations of the investment arm of a billion-dollar firm and the traditional venture capital partnerships, according to Gene I. Miller, a

CW at NCC

principal in Xerox Development Corp. (XDC), a wholly owned subsidiary of Xerox Corp.

Corporate Venture Arms

Corporations committing capital through their investment capital units are often looking for technologies that will be the basis of market expansion — the apparent motivation of Exxon Enterprises, Inc. [CW, May 19]. Or a corporation could be searching for acquisition prospects, Miller noted.

Still another motivation for corporate investments is the opportunity for a spinoff, such as the formation of Axxa Corp. from a venture started by Citibank [CW, March 10].

Recognizing the motivation of corporate venture capital entities, entrepreneurs may prefer to ally themselves with these units.

Why? For one thing, by affiliating with a corporation in a specific industry, the new enterprise gains broad assistance entering its selected industry segment. Assistance can be in the form of management, marketing or the formation of licensing agreements.

Moreover, allying itself with a company like Xerox gives a new venture more credibility, Miller said. However, he pointed out that XDC, founded in 1975, operates along the lines of a traditional venture capital firm. To date it has funded 16 companies, including Apple Computer, Inc. and Paradyne Corp.

In making the decision to accept financing from a corporate venture unit, an entrepreneur should consider the ability of the corporate financier to respond to the needs of the new business and fit the venture into the structure of the corporation.

Importantly, the management of the young high-technology enterprise should be advised when the corporate investor will expect the venture to show results. Miller estimated it takes a startup venture about seven years to become self-sufficient.

Private Partnerships

Yet many up-and-coming high-technology firms avoid financing from corporate venture arms. Often entrepreneurs perceive that a corporation cannot move swiftly enough, William H. Draper III, a principal in Sutter Hill Ventures, contended.

Besides desiring independence, entrepreneurs opting for financing through private venture capital partnerships view corporations as having objectives other than investment, and this makes them leery.

Sutter Hill's motivation is purely return on investment. "If a company can't produce 10 times the original investment in four to six years, we forget it," he said.

A four-partner firm, Sutter Hill is one of the most active high-technology venture capital firms, with original interests in firms such as Prime Computer, Inc., Diablo Systems, Inc. and Qume Corp. Investing about $10 million per year in about 12 ventures, which it pares down from some 400 inquiries, Draper said his firm invests almost exclusively in startup ventures proposed by one or two people.

In choosing its investment opportunities, Draper examines the market size for a firm's product and determines whether the market is ready for that product. In addition, the firm analyzes pricing for that product on a cost, demand and competition basis.

However, aside from all the traditional analyses, Draper said he spends a significant amount of time evaluating the management of an enterprise under consideration. "We are really in the personnel and not the finance business," Draper quipped, emphasizing that his firm often finds and hires the appropriate management for a firm. His firm spends about 50% of its time working out problems of the companies in its portfolio after the investment is made.

But the entrepreneur cannot be a partner for life, Draper advised. Eventually, "we have to decide when to take the return for the investment." In the case of Qume, Sutter Hill sold out for $155 million on a $2.5 million investment.

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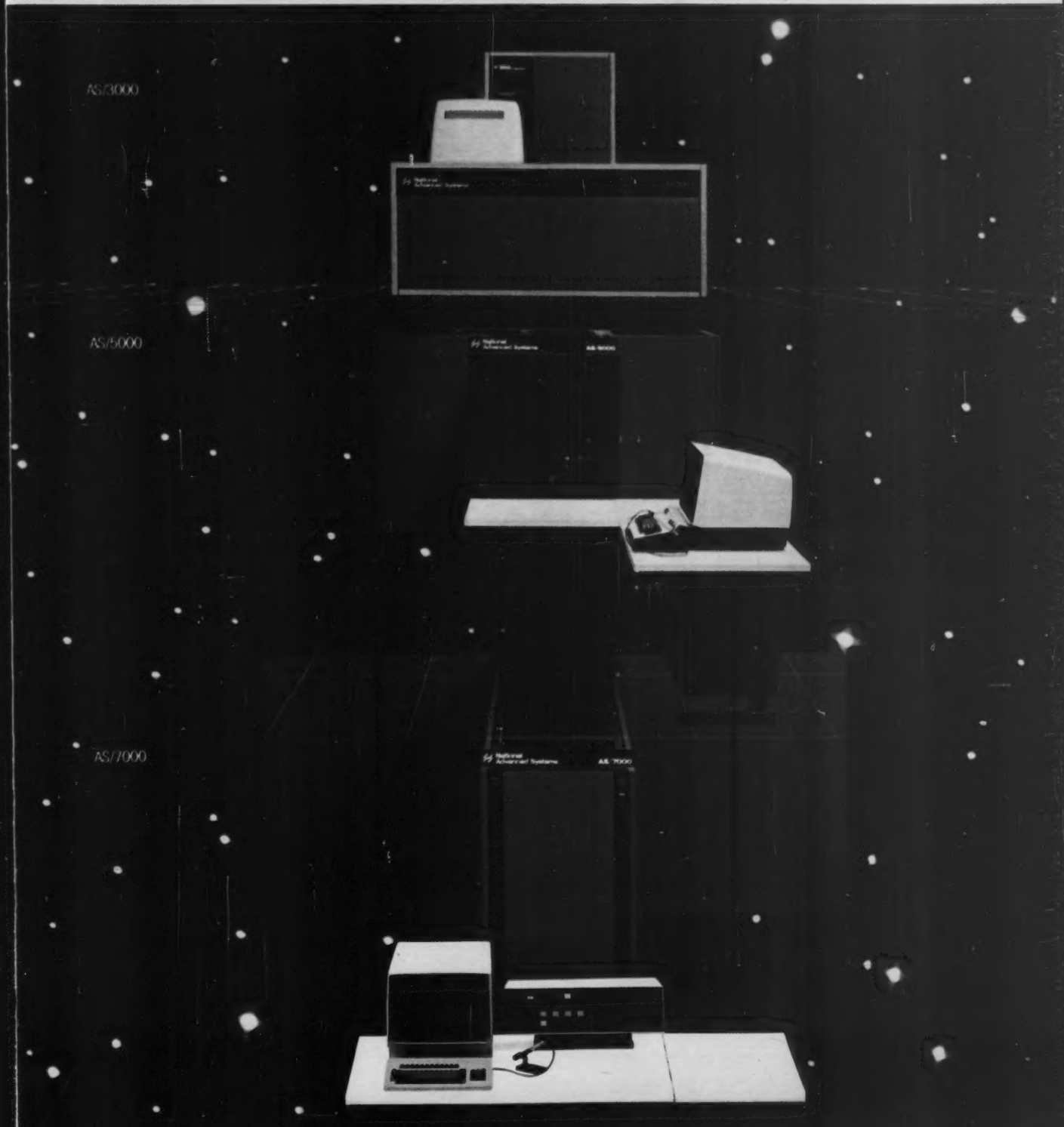

The Education of a British Prime Minister . . .

By Rex Malik
Special to CW

LONDON — "You pay for all of this?" Prime Minister Margret Thatcher asked recently while looking at some data stream figures on the Prestel viewdata set. We were a number of frames in and she had just noticed a cost access figure — five pence— in the top right-hand corner of the frame.

"Why didn't you tell me?" she said in mock horror at the money that was being spent. Everybody laughed.

It must be great to be a prime minister sometimes. When you are on one of these meet-the-people or look-at-an-industry visits, not only will people go to great pains to explain anything and everything, but however weak your jokes, they always laugh.

If they can hear them. At times the visit was in danger of turning into a media event. Almost everybody had sent a photographer, and it was all one could do to hear Thatcher speak above the sound of camera shutters.

The prime minister was making her first visit to the British software industry. Indeed, as far as anyone could remember, it was the first visit of a UK prime minister to the systems and software industry.

The companies that had been chosen for her to see were Logica, Ltd. and Communications Systems and Planning (CS&P), two UK houses with considerable expertise in communications systems. Both make a substantial percentage of turnover contribution to British exports, both have U.S. offices and both have their headquarters in London's Marylebone district, which just happens to be the parliamentary constituency of Kenneth Baker who, more than 10 years ago, was the first member of Parliament to try to move a data protection act.

If Baker had chosen the companies Thatcher visited, he had chosen well. Both companies are success stories, Logica with more than 700 employees, CS&P with less than 20.

Until about a year ago, Logica was controlled by PRC. With the help of the National Enterprise Board, however, it was bought back and is largely controlled by its executives. CS&P, which grew out of a university consulting group, is also controlled by its executives.

Logica last year had revenues of around $27 million and, on the day of the prime minister's visit, was forecasting $43 million this year, which it should make as the financial year ends on June 30. CS&P, by contrast, is forecasting around $1 million this year.

And whereas Logica now has offices in seven coutries, CS&P is restricted to two: the UK and the U.S..

A Lot to See

There was a lot both companies could have shown the prime minister. Logica says that last year it undertook some 400 projects for about 250 customers. If there were a list of the world's 500 largest computer users, many of them would turn out to be Logica clients.

Logica chose to show Thatcher four projects. The prime minister spotted a fifth and sixth across the room and went to look for herself.

Logica is managing the seven-country market trial of Prestel International's viewdata service. This is an attempt by the British Post Office to make the data bases on Britain's Prestel also available internationally.

Naturally, Thatcher was shown joke files and games files: she played "Missionaries and Cannibals." It would not do for prime ministers to be seen losing in public, so before she did, she craftily handed over the conduct of the game to someone else. Any successful politician is good at that sort of game.

Thatcher was also shown

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. . . Thatcher Visits the UK Software Industry

Icon, a computer-controlled graphics generator used by the British Broadcasting Co. (BBC) in its election coverage. Icon was developed by Logica and has since been sold to West Germany, where it was used in the recent coverage of the Rhine Westphalia elections.

Logica then showed the prime minister its word processing system, VTS, which is to be sold abroad. No. 10 Downing Street does not have word processing yet, and Thatcher was suitably impressed as she quickly realized her speeches need no longer go through untold numbers of drafts.

They showed her the BBC's Ceefax system, the British version of the teletext broadcasting system, for which Logica had written much of the software. And she went over to look at some on-line programming ("Let's get the pictures done first," said the prime minister, "then you can really tell me what this is about").

Highlight of Trip

Thatcher's next stop was to inspect the development of a computerized ticketing system for London Transport's underground system. But the highlight of the trip was her exposure to satellite image processing.

Logica representatives explained to her the work they are doing for the European Satellite agency and showed the results of satellite infrared photography on crop location in the south of England.

Thatcher had obviously been reading Frederick Forsyth's *The Devil's Alternative*: "Good heavens," she said. "I can tell anywhere in the world what they planted, when and how it is growing. So you could know what the market is going to be and whether the Warsaw Pact countries are going to come in?"

It was explained to her that there were some technical problems to be overcome and that Europe would need its own satellites. There is a program coming up for joint European satellites in which, according to Logica Chairman Philip Hughes, it is hoped the British Government will play a part.

The point was taken. "But how many satellites would you need for total surveillance?" the prime minister asked. The complexities were explained.

"And how many does the U.S. have up?" she inquired.

"You may have access to that information," Hughes replied, "but we, Prime Minister, don't."

Conferencing System

At CS&P, Thatcher met the designers of the government's own trunk communications network. They discussed methodology to assess the benefits of investing in telecommunications in Third World countries.

The highlight at CS&P, however, was a contract for the U.S. Defense Department Advanced Research Projects Agency (Arpa). CS&P is the only non-U.S. company working on the design of a conferencing system which allows for encryption and data input. It is an audio and visual system which allows for speaker identification almost automatically.

Or, in the jargon, it allows for electronically mediated meeting, and a flip of a switch allows any of its participants to talk privately.

The specification CS&P is devising is for a no-expense-spared system. The facilities being simulated will even allow for translators to be cut into circuit so they can translate technical jargon into language the users can understand.

At that point, the press discovered the government has a system with many of these facilities, though the system is not so advanced. The prime minister said so.

There is known to be a private battle going on in Whitehall, the seat of government, over what, if any, policy the government should adopt toward the British computer and software industries — what sort of funds should be pumped in and how.

The battle has not reached the prime minister's level yet. But it will. One suspects that it will have done no harm to the protagonists of such a policy to have exposed Thatcher to the capabilities of the British industry.

Univac's Williams Sees Element Missing

Handling of Manufacturing Systems Faulted

By Jeffry Beeler
CW West Coast Bureau

NEWPORT BEACH, Calif. – No DP department by itself can guarantee the successful installation of a computer-based production-planning and control system. For the implementation of such a system to go smoothly, DP managers have to work closely with their manufacturing-department counterparts, according to C.R. Williams, vice-president and general manager of Univac's Americas Domestic Division.

Speaking at Univac's third annual seminar on productivity, Williams described manufacturing management's involvement as "key" to the successful installation of a production-planning and control system.

"Manufacturing managers," he said at the recent seminar, "know their problems better than any management information systems expert or computer vendor could ever expect to. After all, they're the ones responsible for [their firms'] overall productivity and production management."

Yet in many user organizations, manufacturing managers are never consulted when the time comes to install a production-planning and control system. Instead, the responsibility for implementing such a system and making it work is left entirely to the users' in-house DPers, most of whom have at best only a partial understanding of their companies' production-related problems.

The widespread tendency to ignore production-floor managers during installation programs and to rely too much on DPers has led Williams to conclude that, in most companies, "the responsibility for manufacturing-system development is in the wrong hands." By all rights, he said, manufacturing and DP management should share the responsibility.

If they don't – if manufacturing managers are overlooked when users try to install a production-planning and control system – the projects "will fail – it's that simple," Williams said.

Solutions for Users

In other remarks, Williams expressed the hope that the "technology-driven" computer industry of the 1970s would give way during the 1980s to an industry increasingly driven by solutions to user problems.

Technological innovation has long been and almost certainly will continue to be one of the computer industry's main driving forces, Williams said, and no one should underestimate its significance, either now or in the future.

On the other hand, he explained, users and vendors alike should avoid becoming so preoccupied with technological progress that it monopolizes their DP thinking and blinds them to other computer-related issues.

As the new decade progresses, Williams added, the ways in which DPers have traditionally looked at the computer industry will gradually begin to change. Instead of being concerned solely with technology for technology's sake (as they have often been in the past), DP people should start thinking more about how to translate some of the industry's latest developments into solutions that users can apply to their everyday problems.

Unlike the 1970s, which were highlighted by rapid technological development, the 1980s should be characterized by a growing emphasis on "user-ability," Williams said.

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Managers on the Move

SAMUEL MILLER has been named director of purchasing and information systems at Summagraphics Corp. in Fairfield, Conn.

Miller previously held positions in purchasing management and information systems with Sikorsky Aircraft and Burndy Corp.

He holds a B.S. in business administration from the University of Bridgeport.

•••

CAROL J. NORVICH has been appointed director of management information services at Rust-Oleum Corp. in Vernon Hills, Ill. She will be responsible for the overall development and maintenance of all corporate computer services and management information systems.

Norvich, who joined the company in 1977, served as applications programming manager and lead programmer before being named to her new position. Prior to that, she was a consultant with Hewitt Associates, Lincolnshire, Ill.

She holds an undergraduate degree from Northwestern University and is currently pursuing an advanced degree from the Lake Forest School of Management.

•••

GARY J. WORSHAM and JAMES A. McCOY have been named to new positions in the Management Systems Group of United Gas Pipe Line Co. in Houston.

Worsham, formerly manager of financial systems development, was appointed director of financial systems development. He joined United Gas in 1976 as a senior systems analyst/programmer and has been systems supervisor, systems manager and manager of financial systems development.

Worsham earned a B.B.A. degree in statistical analysis at the University of Texas at Austin.

McCoy, formerly systems supervisor, was named manager of systems planning and research. He joined the company in 1976 as a senior systems analyst/programmer. In 1977, he was named lead systems analyst/programmer and was promoted to systems supervisor in 1978.

In his new position, McCoy will be responsible for conducting short- and long-range planning, advanced application analysis, special studies and industry surveys. He also will be responsible for research activities into new industry trends, techniques and technological advancements for the Management Systems Group.

McCoy received a B.A. degree in psychology and accounting from the University of Houston.

•••

DANA D. SQUIRE has been appointed director of a new corporate management information systems department at Kaiser Aluminum & Chemical Corp. in Oakland, Calif.

Squire was former Western Region group vice-president of Laboratory Procedures, Inc., a wholly owned subsidiary of the Upjohn Co.

At Kaiser, Squire will manage the functions of 10 corporate departments including DP operations, field systems telecommunications, sales systems, benefit systems, payroll and personnel systems, accounting systems, procurement systems and plant manufacturing systems.

In addition, he will direct the systems departments of the corporation's U.S. and overseas plants and facilities, will coordinate the company's word processing functions, and will coordinate the time-sharing requirements of the corporation's divisions and the technical information services of its research and development center.

Squire holds bachelor and master of science degrees in chemical engineering from Michigan State University and an M.S. in industrial administration and a Ph.D. in industrial engineering from the University of Michigan.

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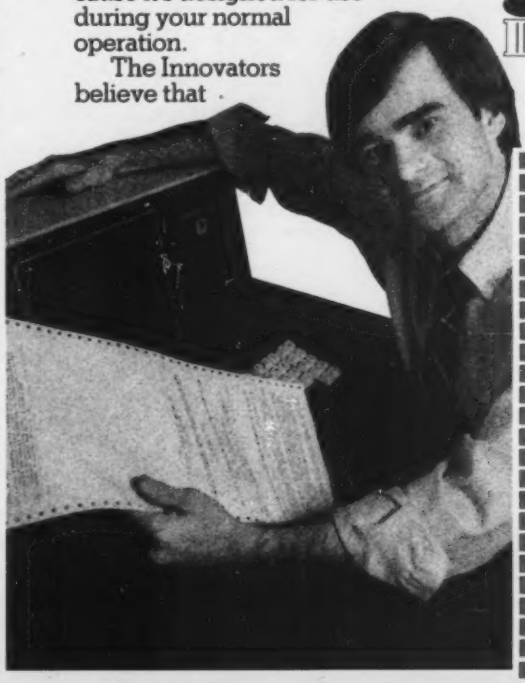

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'Pay Was the Problem'

Postal DPers Give Mixed Views on Unionization

By Ann Dooley
CW Staff

FRAMINGHAM, Mass. — Some DPers like them, others want nothing to do with them.

They're unions — a prospect that is confronting managers and DP professionals alike. And the programmers and systems analysts who either are union members or work in a unionized DP shop express varying opinions on whether DP professionals should unionize.

Although DP unions are still rare, two departments in the St. Louis Postal Service turned to unions in the last several years as a way of coping with management problems.

The St. Louis Automatic Data Processing Center collects the time and attendance figures from 72 major post office centers in the western half of the country. In early 1978, 44 of the 52 data center employees ratified a union contract with the American Postal Workers Union (APWU). Job categories ranged from junior-level data control technician to senior systems analysts.

Pay Scale

"Pay was the problem," David Anderson, quality control officer (systems analyst), stated. The union was ratified to bring pay increases, but it "hasn't done anything for us," Anderson said, claiming that the pay scale actually decreased after union negotiations.

Unions are not ready to accept professionals, such as DP personnel, and negotiate properly for them, Anderson charged. The national union makes no distinction between professional and line people, he claimed, adding that until unions realize that different job categories have to be treated differently, there will be problems.

Anderson's local recently filed a lawsuit in the Eastern District Court of St. Louis against the U.S. Postal Service and the APWU regarding discrepancies in their recent cost-of-living raises. Depending on the outcome of the lawsuit, union members may petition to have some jobs taken out of the union — namely, the professional-level jobs.

The professional DPers originally favored a union because they had invested time in their present jobs and were not interested in job-hopping — something done more frequently in the private sector. Most are in their mid- to late forties and are planning to retire when they reach age 55.

"If I were 30 years old, I would leave so fast the door wouldn't hit me on the way out," Anderson said. "But at my age, what does it take to stay another few years?"

Management did not object very much to the union either, Anderson noted. "But unionization, for us, wasn't everything we thought it was supposed to be," he said. One problem was that by law "we were limited to which unions could represent us and so we weren't free to choose what we thought would be the best one."

Positive Story

A different union story can be heard at the St. Louis Postal Data Center, which handles various financial functions for the Postal Service and which has been represented by the St. Louis Gateway local of the APWU since 1976.

Approximately one-third of the 300 people in the bargaining unit are union members. Many others have not joined because they are covered under union contract regardless of whether they belong to the union, according to Rita Garcia, accountant and union local president.

The union was voted in because of a lack of guidelines in promotions, hiring, raises and training, according to Garcia, who asserted that most people are very happy with the union representation.

Even management is very positive, Garcia said, noting that many of the managers had worked their way up and had been union members at one time. "The union created a system for both parties to work under."

The higher level DPers needed more convincing to accept the union, she noted. They considered themselves a unique breed and felt their jobs were a stepping-stone into management.

But the managers made greater demands on them than they had expected, and the increased responsibilities were not necessarily reflected in their salaries. When it became a pocketbook issue, the DPers started thinking union, she recalled.

Most of the problems apparent prior to unionization have been resolved or at least have the framework to be resolved, Norwell Smith, senior computer programmer, said. Smith joined the union because management was not giving people a "fair shake." On the other hand, John Gregory, senior programmer analyst at the center, has not joined the union because "it has made a difference at lower level jobs, but is a paper tiger at my level."

Unions can be very beneficial, but this particular union is not attuned to the specific problems that programmers and analysts encounter in their jobs here, he said.

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Software Snags Tied to Ineffective Systems Use

By Bruce Hoard
CW Staff

WOBURN, Mass. — Software productivity is "the principle obstacle to the effective use of computer systems technology," according to William F. Zachmann, research director of Information Systems Planning Service at International Data Corp. (IDC).

Zachmann made his remark at the Expo '80 Conference and Exposition here recently.

The gap between white- and blue-collar production graphically portrays the problem, Zachmann said. White-collar productivity has shown no significant increase in the past 10 years, while blue-collar productivity has surged.

Hardware vendors are affected by low software productivity because they are manufacturing more hardware than there is software to run on it, he said.

In order to alleviate that problem, large companies such as Burroughs Corp., Univac and IBM will be making more software announcements in the near future, Zachmann predicted.

IDC conducted a study of the software problem, focusing on ways to measure productivity, tools that enhance it and the impact of organizational climate and management practices on the motivation of systems development.

"One trend has become very, very clear. Over the past 15 years, the only generally used measurement of productivity has been lines of code generated per man-month," Zachmann said, and added that that measurement is outdated and misleading.

For instance, while some programmers write lots of code and get few usable results, the reverse can be true for others, he explained. Also, test code and code generated and discarded may or may not be counted.

"What we really want to measure is usable systems product," he stated.

Bolstering Productivity

Some of the tools being used to bolster software productivity include higher level languages, on-line debugging and testing and structured design and programming.

But even though there is a widespread belief among programmers that higher level languages such as Pascal have advantages over Fortran and Cobol, 80% of DP shops surveyed still use one of the latter, Zachmann said.

Programmers are also enthusiastic about on-line debugging and testing, but managers do not value it and say it wastes CPU time, he claimed.

While 70% of the IDC survey's respondents said they utilized structured design and programming, many of them are actually gaining little from that use, he contended.

"Buying a Stradivarius does not make you a maestro," Zachmann said, referring to the mixed use of productivity tools.

Expecting Too Much

Jack Rosenbaum, director of the New York office of Higher Level Software, said DPers frequently expect too much from software systems. When that happens, they may fail to utilize the system properly and end up with a decline in productivity. He dubbed that unfortunate man-machine interface "negative synergism."

Like Zachmann, Rosenbaum lamented the lack of precise productivity measurements and went on to say a system's success may be determined arbitrarily. "One person may have brought in a system, and it may be his goal in life to defend that system," he said.

Advocating a "modern approach" to applications development, Rosenbaum said the combined use of "structured diagrams" and testing models leads to a well-ordered assessment of software needs.

Structured diagrams attempt to show how different elements of a system are needed by showing the links of their functions by means of flow charts. This representation allows planners to more readily envision proposed systems, Rosenbaum said.

Just as important is the use of models; if used judiciously, they "simulate and study the performance of a system while establishing performance criteria," he explained.

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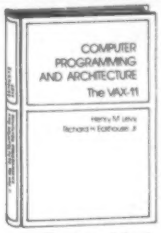

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by Henry M. Levy and Richard H. Eckhouse, Jr.

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Calendar

June 24-26, Leiden, Netherlands — **International APL Congress,** sponsored by the Dutch Computer Society and European Cooperation in Informatics. Contact: Leiden University Computing Center, Posbox 9512, Leiden 2300 Netherlands.

June 25-27, Sao Paulo, Brazil — **DP Long-Range Planning.** Contact: Compucenter do Brazil Ltda., Caixa Postal 51674, 01000 Sao Paulo SP, Brazil.

June 25-27, New York — **Minicomputer Systems: Guidelines for Successful Selection, Acquisition and Operation.** Contact: Datapro Research Corp., 1805 Underwood Blvd., Delran, N.J. 08075.

June 26-27, Washington, D.C. — **How to Find Information on Telecommunications.** Contact: Information Gatekeepers, Inc., Suite 111, 167 Corey Road, Brookline, Mass. 02146.

June 26-27, Boca Raton, Fla. — **Managing Change: the Primacy of the User,** sponsored by Association of Computing Machinery. Contact: Dr. Elias Awa, Florida International University, Tamiami Trail, Miami, Fla. 33199.

June 30-July 2, Rio De Janeiro, Brazil — **DP Documentation and Procedures Manual.** Contact: Compucenter do Brasil Ltda., Caixa Postal 51674, 01000 Sao Paulo SP, Brazil.

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Thinking About Pointer System

FBI Abandons NCIC Message-Switching Plan

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — The Federal Bureau of Investigation has abandoned its plan to operate a central message-switching system linking state law enforcement data banks of criminal records in favor of a decentralized communications system controlled by the states themselves.

Following congressional approval, the FBI National Crime Information Center (NCIC) is planning a feasibility study of an FBI Interstate Identification index (Triple I) — sometimes referred to as a "pointer system" — that states can access to find if criminal records are maintained on an individual by any other state.

Once that information is obtained, the inquiring state will communicate directly through the Phoenix-based National Law Enforcement Telecommunications System (Nlets) to request an on-line transfer of the needed records, according to Lawrence Lawler, NCIC section chief.

Triple I could replace the present Computerized Criminal History (CCH) program, which for about 10 years has been mired in political controversy over privacy issues as well as questions about whether a federal police force like the FBI should control communications between state police agencies [CW, May 28, Aug. 13, 1979].

According to Lawler, NCIC always planned to decentralize the CCH program, but Nlets did not have the DP capacity to offer the on-line communications necessary for a full interstate criminal records exchange. Because of a recent Nlets decision to beef up its DP capacity — it now has a redundant system based on two Digital Equipment Corp. PDP-11/70s — the FBI is no longer considering its own message switch, he said.

The object of message switching in general, either by NCIC or Nlets, is to allow all criminal records to be maintained at the state level and release the FBI from having to maintain a central records facility, a facility seen by CCH critics as a potential national police data bank.

Because Nlets is fully controlled by the states, FBI involvement in Triple I should not be so controversial, the bureau hopes.

Theoretically, this pointer-type system, supported by Nlets with files of single-state offenders in each state, should eliminate the need for the CCH program (the FBI's data base of multistate criminal offenders), but it may not work that way, sources indicated. The FBI has not actually said it would give up its file of multistate criminal offenders.

Feasibility Study

The Triple I proposal should be more palatable to Congress and to states that have objected to CCH costs and policies, according to William A. Bayse, assistant FBI director, Technical Services Division.

"We would like to get a viable criminal records program for the states," Bayse said. "We have a responsibility in that area. We are looking at this [Triple I] as an alternative to centralization."

The feasibility study which involves only Florida, has "the full support" of Congress, added Lawler, who acknowledged that NCIC message-switching proposals had become "politically unacceptable."

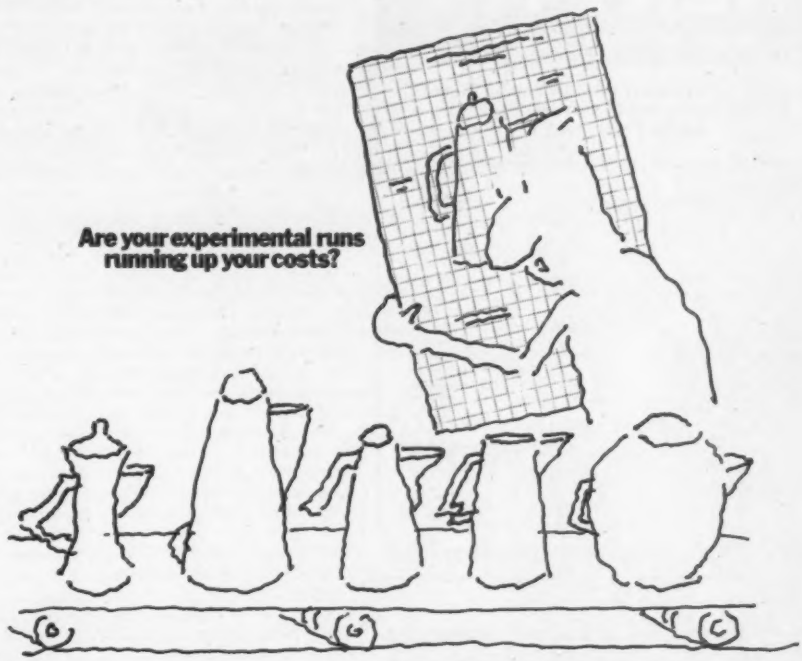
A three-month pilot program is expected to start sometime this summer. The NCIC will be evaluating the effectiveness of the plan, the costs involved to the FBI and state governments and various managerial questions, such as who sets policy for the joint federal-state system and who guarantees privacy of the records, Lawler said.

In the meantime, Congress's Office of Technology Assessment (OTA) is expected to complete an in-depth study of NCIC by July. The Triple I proposal is one aspect of NCIC operations under OTA investigation.

In addition, legislation now before Congress would direct the FBI to establish an independent study group to look at various options in NCIC operations.

But as Lawler noted, those are broader studies. The Triple I proposal is only directed at seeking the best system for the CCH program.

As seen by the FBI, the Triple I feasibility study fits in well with OTA study and the intent of the proposed legislation. All three, bureau officials noted, are efforts to end the 10-year CCH controversy.



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Automation Prescribed for Food Stamp Project

By Jake Kirchner
CW Washington Bureau

WASHINGTON, D.C. — A large dose of computerization has been prescribed by Congress for the Agriculture Department's financially ailing food stamp program.

The $10-billion-a-year program has run out of money, and the Senate and House are turning to automation to reduce the program's administrative costs and control fraud and error in food stamp administration.

Under the plan now before Congress, the states, which administer the federally financed program, would be given incentives to further computerize their portions of the program. To control fraud, food stamp records would be matched by computer with Internal Revenue Service, Social Security Administration and state-level records to ensure that food stamp recipients meet the program's income requirements.

Hit hard by inflation and unexpected increases in the number of recipients, federal food stamp funds are expected to run out by the end of May — months before the end of the fiscal year.

The Senate has already passed legislation raising the spending authorization of the program for the remainder of the fiscal year. Final action by the House ran into trouble because several general budgetary measures had to be passed before the food stamp program could be revitalized.

Earlier this month the House appropriated the additional $2.5 billion needed to finance the program through the fall. Final approval for extending the food stamp program was expected.

May 15 was the deadline for acting on the program so funds would not be suspended.

Although numerous amendments to the food stamp bill were debated in the House, substantial bipartisan agreement assured acceptance of the computer matching and automation sections of the legislation.

Higher Federal Funding

In its consideration of the bill, the House Agriculture Committee determined that DP and information retrieval systems "promise to help to control program error and reduce program costs well beyond the investment incurred in installing and operating them." Noting economies gained by increased automation in the Medicaid and welfare programs, the committee said that in every state in which there was "a major error problem" in food stamp administration, "one significant aspect of the problem has often been an inadequate computer system."

To provide "substantial incentive" for states to increase computerization of food stamp programs, the legislation would provide for federal payment of 75% of state automation costs. Current federal administrative assistance is 50%.

The increased funding would cover "all costs involved in originally bringing [DP] equipment, services and systems to bear on the food stamp program" — all costs associated with planning, designing and installing DP systems.

The plan would be "a one-shot infusion of federal funds" and would not cover continuing DP costs for administering the food stamp program, which would still be eligible for the 50% federal reimbursement.

Plans for Efficiency

The House committee said $25 million spent the first year for further state automation could lead to savings of several hundred million dollars. To make the program even more efficient, states would be expected to make their DP systems compatible with Medicaid and welfare computer systems, which already extensively use computer matching to control duplicate or fraudulent payments to recipients.

To beef up the error and fraud control procedures, the committee recommended extending computer matching authority under the program beyond the Social Security and welfare records now available to food stamp administrators. Calling computer matching "the most effective means for reducing fraud," the committee advocated making available wage, benefit and other financial information held by the Social Security Administration, state agencies and various federal agencies, including the Internal Revenue Service.

Wage and benefit records maintained by any federal agency would be available. Ideally, records on salary, retirement, welfare, unemployment, and veterans' benefits — all personal income data — could be checked to make sure food stamp applicants meet eligibility requirements.

Addressing "the concerns of privacy" raised by computer matching, the committee proposed a number of record-keeping, safeguard and disclosure requirements food stamp regulators would have to meet to perform the computer matching called for in the legislation.

California Computer Camp Open to 10- to 15-Year-Olds

SANTA BARBARA, Calif. — Young people between the ages of 10 and 15 can get a jump on the computer world and still enjoy the amenities of traditional summer camps by attending Computer Camp this summer.

The camp is nestled in the heart of Los Prietos National Forest near here and equipped with the latest personal microcomputers. According to a spokesman, there is one computer for every two campers.

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Computer Camp will be held at Rancho Oso, a 310-acre summer camp, and will feature five two-week sessions running from June 22 through Aug. 30.

The tuition is $795 per session. Discounts are available for multiple registrations per family and for stays longer than one session, the spokesman noted from Computer Camp, Inc., Suite G, 1235 Coast Village Road, Santa Barbara, Calif. 93108.

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Leaving Interest Restrictions Behind

Citicorp Credit Card Center to Migrate West

By Tim Scannell
CW Staff

NEW YORK – Citicorp is moving its credit card operations – lock, stock and computers – west, but not because of any Horace Greeley-type urgings.

The parent company of this city's largest bank and the nation's leading credit card vendor is shifting its computerized charge card center to Pierre, S.D., to take advantage of unlimited interest rates in that state. Presently, New York puts an 18% per year cap on credit card charges and less if a consumer's debt is above a certain level.

Other reasons for Citicorp's move include cheaper telephone lines, less expensive real estate and an overall savings in general operating expenses in South Dakota compared with New York, according to a Citicorp spokesman.

What's more, enticed by these financial carrots, other banks may soon follow the credit card migration to west of the Mississippi, another bank spokesman said.

Details of Transfer

Although details of Citicorp's move are still sketchy, the transfer is expected to affect all of the company's 1,800 to 2,000 employees that operate the credit card branch in Huntington, L.I. This number includes all of the firm's credit card DP staff. Employees will be given the option to move with Citicorp or take a chance on being relocated somewhere within the firm's banking network, the spokesman added.

However, as part of the negotiations, Citicorp has already committed at least several hundred jobs to Pierre residents and does not know exactly how many New Yorkers will want to pull up stakes to move with the company. Close to 2,500 people – DP and non-DP – will be needed to staff the new credit card operations center, according to one report.

Since the Federal Reserve Board and the comptroller of the currency have yet to approve the move, Citicorp has not decided whether to use its present DP equipment at the new site or install different systems. Citicorp's DP operations here are supported by a variety of computers, primarily IBM 3031 and 3032 mainframes.

Final system and staffing decisions will be made following the Federal Reserve Board's approval, expected to come sometime in July. Citicorp hopes to have its credit card operations set up by the end of this year and running at full steam by mid-1981.

Citicorp has close to six million Mastercard and Visa credit cards outstanding, with around 80% of them held by individuals living outside New York state.

Chase Manhattan

Another bank concerned with New York's low usury ceiling and feeble credit card profits is the Chase Manhattan, considered to be this city's second largest bank.

Although Chase Manhattan does not have any plans to relocate its credit card computers and staff, a future shift to a state like South Dakota is one of the options currently under consideration. However, there are a few important differences between Chase's computerized credit operations and Citicorp's. For example, while Citicorp maintains a dedicated bank of computers that focus primarily on tracking credit card transactions, Chase's IBM and Digital Equipment Corp. shop is used for across-the-board banking activities.

Since Chase's DP equipment is not on a one-to-one basis with its charge card applications, the company could not just close up its entire operations and plant its roots in another state, the Chase spokesman noted.

If Chase were to relocate its charge card operations sometime in the future, it would most probably set up a dedicated site out of state that would not severely impact the firm's present DP shop and staff, he explained.

At least one thing is certain, however: interest ceilings restricted to 18% and under make it virtually impossible for any bank's credit card operations to turn a profit, the Citicorp spokesman observed. In fact, for the first time in history the credit card industry as a whole is actually losing money, making it more attractive for banks to relocate to less interest-restrictive states.

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'And All the Information Fits Right Here on This Piece of Microfiche.'

Panalists Point Out Obstacles In Merger of DP, WP Technologies

By Bruce Hoard
CW Staff

WOBURN, Mass. — The merger of word and data processing technologies is close to becoming a reality, but still faces considerable obstacles, panel members at the Expo '80 Conference and Exposition agreed here recently.

Similarities between WP and DP are growing; today, WP equipment can calculate, sort and produce heavily formatted reports, Charles I. Norris, manager of the automated Business Communications Program at International Data Corp. (IDC), pointed out.

However, in the area of communications, users have had difficulties in transmitting data and text traffic on the same communications link in the past, he noted, adding that the development of electronic mail and compatible protocols are evidence of progress.

Underlining that point, Norris said, "DP and WP have parallel missions to represent information when and where it is needed."

Some of the problems hampering a WP-DP merger at the present time include excessive WP drain on CPU storage and the unwillingness of end users to acclimate themselves to the increased operational demands it would place on them, Norris said.

The merger of WP and DP also carries ominous political overtones, Norris pointed out. The issue of centralized control could bring about a "Mexican standoff" between DP and office administration departments.

User Views

Citing an IDC study of 25 Fortune 500 companies with distributed data processing systems, Norris noted that users rated data entry highly important, while WP was not yet considered important.

Nonetheless, users see WP playing an important role in the future, and small companies especially will experience the DP-WP overlap that could result in mergers, he said.

Willoughby Walsche, executive editor of *Word Processing Systems Magazine*, said DP and WP personnel "live in two different worlds. One doesn't talk to the other and when they do, it's in different languages."

DP is production-oriented while WP can be suited to the needs of the individual user, Walsche added. Moreover, DP is more complex and requires operating systems and programming while WP frequently uses turnkey systems.

Common Features

Despite their differences, the two technologies are slowly drifting together and currently share several commonalities, Walsche continued.

DP, WP and data communications all use CRTs, storage media and peripherals such as printers, making it "ridiculous" not to combine their duties, she added.

Like Norris, she noted how WP equipment is duplicating formerly proprietary DP roles, such as math and sorting, through the use of application programs.

"If the two technologies are to be merged, WP equipment must be expandable so storage and peripherals can be added," she said, adding that the equipment must also support software packages.

Duplication of Efforts

Consultant Norman M. Martin decried the duplication of WP efforts and said a person operating a typewriter should never have to pass copy on to a teletype operator for rekeying unless the message is nondomestic.

There are three ways to reach the "office of the future" that everybody's talking about, Martin said. They include the use of compatible communications, peripheral devices and "black boxes."

Both DP and WP equipment must accept digital communications, and even then there will be linkage problems, Martin said, adding that text editing equipment may use asynchronous protocols while a computer program may be synchronous.

One peripheral bridging the DP-WP gap is the optical character recognition (OCR) reader, which merges WP applications with number crunching, according to Martin. Magnetic card units can also share in the DP environment by being connected to shared logic and reading cards in the host system, he said.

Microprocessor-based black boxes can help to compensate for the lack of communications ports on WP equipment by duplicating their functions, Norris said.

Meet to Cover Model Acceptance

LA JOLLA, Calif. — The Society for Computer Simulation (SCS) will hold a conference and workshop on the topic of "Model Acceptance" Sept. 3-5 in Washington, D.C., at the Cannon House Office Building.

The workshop will bring together an international team of speakers to address the issue of "how computer modeling activities can better serve nations and societies through wider acceptance and understanding by those in power," according to John McLeod, co-organizer of the event.

More information on the meet is available from McLeod at the SCS, P.O. Box 2228, La Jolla, Calif. 92038.

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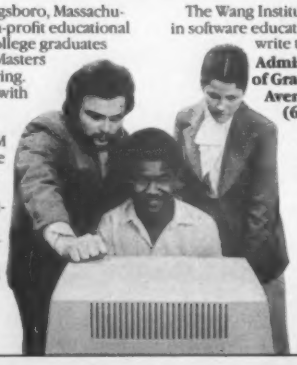

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In $750,000 Deal

FAA Contracts to Develop Collision Avoidance Units

By Marguerite Zientara
CW Staff

WASHINGTON, D.C. — The Federal Aviation Administration (FAA) has awarded a $750,000 contract to Textron, Inc.'s Dalmo Victor Division of Belmont, Calif., for development and testing of three prototype microprocessor-based airborne collision avoidance systems (CAS).

The contract calls for delivery of the three units — two operational and one spare — in the spring of 1981. They will then be installed in agency and airline aircraft for a year-long test and evaluation program designed to prove the feasibility of the equipment in actual operations.

Currently negotiating with several airlines for the project, the FAA estimates that production models of the equipment could be commercially available in 1983.

Active System

Dalmo Victor's Active Beacon Collision Avoidance System (BCAS) works in conjunction with the transponder/-altitude encoder already installed in an estimated 200,000 private and commercial U.S. aircraft, according to an FAA spokesman.

Normally, the transponder/altitude encoder in an aircraft is triggered by ground-based radar, which then sends a signal through air traffic control computers to tell controllers each aircraft's identity, ground speed and altitude.

The airborne Active BCAS system will also be able to trigger the transponders, "listen" to the replies, sort out those that present a potential hazard and alert the pilot to any problem, the spokesman said.

The system can advise a pilot of the range, altitude and bearing of any threatening aircraft and can issue climb or dive instructions to a pilot in the case of a potentially dangerous situation, he added.

Along with the good points of an active system are some disadvantages, according to the spokesman. The active system does not have left/right evasive action instructions; it "broadcasts" in order to find where aircraft are, thereby degrading the radio frequency environment in high-density air traffic areas, the spokesman acknowledged.

Such drawbacks have been cited by Litchford Electronics, Inc. of Northport, N.Y. — developers of a microprocessor-based Passive BCAS that is currently being studied by the National Aeronautics and Space Administration.

Three-Pronged Program

The FAA, however, believes the passive Litchford system would not be effective in such a test situation and is continuing research on its active system as part of a three-pronged program.

That program includes the Automatic Traffic Advisory and Resolution Service (Atars) in conjunction with the FAA's ground-based Discrete Address Beacon System (Dabs), which would connect the ground air traffic control system and other data sources to aircraft via an automatic data link.

The FAA's research program also includes two BCAS programs, the spokesman said. The Active BCAS program consists of work being done mainly at the Massachusetts Institute of Technology, Lincoln Laboratories and now Dalmo Victor, he explained.

Thirdly, there is a Full-Capability BCAS development program — an extension of the Litchford concept, according to the FAA spokesman — wherein "a whole range of subcontractors" are doing individual studies and experiments for the FAA.

The Full-Capability system would probably not be available until "perhaps the 1986 time frame."

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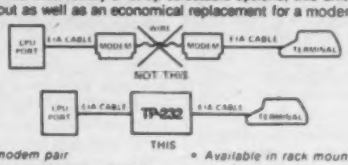

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Send replies to The Editor, Computerworld, 375 Cochituate Road, Rte. 30, Framingham, Mass. 01701.

Summer Institute to Cover Cobol

SAN FRANCISCO – Golden Gate University here is offering a Summer Institute focusing on structured Cobol programming techniques as most commonly applied to IBM systems in a business environment.

Designed for those with little or no prior programming experience, the program includes eight seminars consisting of four three-hour instructional sessions with a two-hour workshop following each session.

Topics include "DP Basics," "Introduction to Structured Cobol," "Applied Fundamentals of Cobol Programming," "Introduction to 360 and 370 JCL," "Sequential File Application," "Table-Handling Techniques," "Non-sequential File-Accessing Techniques" and "Cobol Sort and Report Writer."

The $1,600 fee for the two-month institute includes books, computer time and instructional materials. Further information can be obtained from Golden Gate University's Information Science Department, 536 Mission St., San Francisco, Calif. 94105.

Seminar to Review Ada

LANHAM, Md. – A one-day seminar reviewing Ada, the standard language which will be used for future Department of Defense embedded computer software, will be held at the Ramada Inn here June 25 from 9 a.m. to 4:30 p.m.

The featured speaker at the seminar, sponsored by the Association of Computer Programmers and Analysts, (Acpa), will be Dr. David A. Fisher, who will discuss the impact of Ada language development on the software industry. Fisher is a staff specialist for computers, communications and command and control for the Office of the Undersecretary of Defense for research and engineering.

Fees are $120 for Acpa members and $140 for nonmembers, with $20 being applicable to Acpa annual membership. Additional information is available from Acpa at 294 Main St., E. Greenwich, R.I. 02818.

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Threat to Centralized Organizations

Business Exec Issues Alarm on Data Flow Laws

By Phil Hirsch
CW Washington Bureau

DETROIT — Foreign data protection laws restricting the kinds of information that can be transmitted to DP centers in other countries pose a growing threat to U.S. companies operating overseas, the vice-president of one such company said here recently.

The threat is particularly serious for companies with centralized management organizations, according to John Kendle of Cleveland's Eaton Corp. Addressing a technical session at the International Communications Association annual meeting, Kendle said that if present trends continue, his company's direct costs will increase $80,000 a month in West Germany alone. The money will have to be invested in computers and support to do work now performed by an Eaton DP center in England.

Germany has enacted a law, he explained, that bars transmission of payroll and other employee records across its borders beginning in 1982.

Clear Direction

Such laws are particularly threatening to centrally managed companies, Kendle pointed out, because centralization required a continuous flow of detailed financial, sales and production accounting information from the branches to headquarters. This is precisely what the laws are attempting to limit.

So far, he added, the impact has been softened because the laws on the books are being modified somewhat by their administrators in most countries, and many of the most burdensome proposals have not yet been enacted.

But Kendle emphasized that the direction is clear — it's toward more and tighter regulation. As he put it, the bigger danger is not "Big Brother" but "Big Reggie" — a set of government regulations that cover nonsensitive business data as well as sensitive personal information. Eaton Corp. — a worldwide manufacturer and marketer of truck components and appliance controls — believes strongly in the need to protect personal privacy, he emphasized.

One likely result of data protection regulation is that centralized companies like Eaton will be forced to restructure their management organizations, Kendle said, because the restrictions will make centralized management impossible.

He appeared to be particularly concerned about proposals in several European countries to classify business firms as "legal persons." Legislation now under consideration would make the accounts receivable, prospect lists and other proprietary files of such "persons" subject to government inspection without advance notice.

Get Involved

Kendle urged computer and communications systems managers to get involved in the data protection battle by alerting their top company executives and legislators to the treat. Lawyers, academics and government officials have been the principal participants so far, he said.

The lack of participation by business people, particularly those with computer and communications expertise, is especially serious because only this group has the technical expertise needed to understand many of the implications of data protection regulations.

Era of Protectionism

Another speaker at the same session — attorney John Eger — said that while much has been written and said about the "information society" and its importance to the U.S.' domestic and international economic future, the accompanying "politicization of technology" is seldom appreciated.

"We are heading for an era of protectionism the likes of which have never been seen," said Eger, who was the President's chief telecommunications adviser in the Nixon and Ford Administrations. Restrictions on the flow of data across international borders will be a common protectionist tactic of other countries, he contended.

According to Eger, a recent statement by Louis Joinet, author of the French privacy protection law, accurately reflects a prevailing attitude in many countries.

Basically, Joinet said that information is power and economic information is economic power; a country which loses control over the storage and processing of its data loses sovereignty as a result.

Boston Women DPers Meeting on Thursday

BOSTON — The recently formed Greater Boston Chapter of the Association for Women in Computing will hold a meeting May 29 at the Shawmut Bank here.

Robert L. Brown, president of Conec Co., is scheduled to speak on "Managing Your Career." The meeting opens informally at 6:30 p.m., with official business starting at 7 p.m.

The meeting will take place on the eighth floor of Shawmut Bank, located at 1 Federal St. in downtown Boston.

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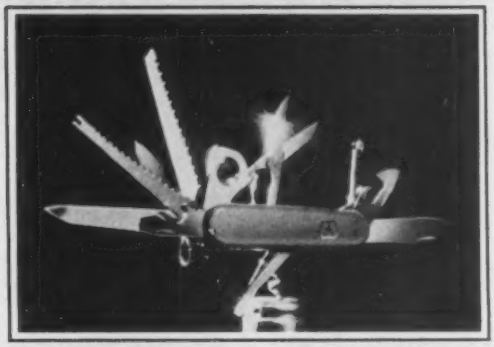

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On System Design Methodologies

Q In response to a March 31 "Turnaround Time" question concerning system design methodologies, I submit the following response:

We use a modified version of Arthur Andersen's Systems Development Methodology. We installed it in late 1978 and are only now seeing some positive results.

Reluctance to use a structured design methodology was very strong and still remains fairly high because a structured approach does tend to take longer. Adapting to a structured design methodology has been more painful to our management people than for our system analysts because of the extended time required to produce the finished system project.

We are slowly beginning to realize that the benefits derived from implementing a system that follows structured design methodology far outweigh the time saved by using a "seat-of-the-pants" approach. In our situation, implementing a methodology has been like breeding elephants:

- All work takes place on a high level.
- It is accomplished with a great deal of shouting and screaming.
- And it takes about two years to see the end results.

A What more can I say?

Q I'm responding to the request in "Turnaround Time" for information relative to installation of a systems development methodology. My experience is with Spectrum International, Inc.'s Spectrum-1.

All other things being equal, smaller DP organizations can and do implement faster than larger ones. DP organizations with 25 to 50 analysts and programmers typically get Spectrum-1 installed in nine to 12 months. Very large DP organizations (more than 200 analysts and programmers) may never get fully implemented according to my definition (see below). Again, great benefits may be gained from the "journey" to install the methodology. The problem is, they just never get to the destination.

Installing a methodology is not a technical challenge, it is a social one; we are asking people to change the way they do things. These people (particularly analysts) tend to view themselves as instruments of change, rather than objects of it.

Organizations that treated Spectrum-1 implementations as a formal project have accomplished the implementation in shorter time and with higher success.

This means having a project leader, a well-defined and documented project plan and regular and meaningful project reviews.

I don't believe you can say that implementation of a methodology is complete until all of the following have been accomplished:

- Management has issued and intends to enforce a set of policies which are consistent with the methodology.
- Management has budgeted for the administrative resources needed to support continued success of the methodology.
- User managers set the priorities for projects and DP is out of the "priority-setting business."
- Users are committed to the projects and accept their roles as project sponsors and quality reviewers.
- Pilot projects with regular quality review are well along in following the methodology and all new projects will be started under the methodology.
- The staff has been trained.
- The methodology has been customized to suit the local environment and a sufficient quantity of manuals and forms are available.
- The documentation turnover process — to users, operations and systems — is functionally smooth.
- Updating of documentation on older but volatile systems is under way.
- Project team members are regularly reporting their time utilization and their progress.
- Regular project status reports are issued by project managers.

A Performance measures should be established in order to evaluate the effectiveness of a project to implement a system development methodology.

Your list of performance measures is well conceived and surely will be helpful to many DP managers who have implemented or are considering implementing a methodology.

Have a question? Send it to Larry Long, Editorial Department, Computerworld, *375 Cochituate Road, Rt. 30, Framingham, Mass.01701.*

Long is a professor at Lehigh University, a DP consultant and author.

On June 30th, Computerworld will show you how to evaluate and choose systems and utility software packages.

Don't miss this Computerworld Special Report, *Systems and Utility Software*—Ad close is June 13th.

With the ever-expanding number of software packages available, finding the best one for your needs can be confusing.

In this Special Report, edited by Marcy Rosenberg, we'll answer the important questions for selecting software such as:

- How to evaluate the various types of systems and utility packages.
- How to choose a supplier.
- When to stick with software supplied by the hardware vendor—and when to turn to independent software developers.

You'll also read accounts of user experiences, tutorial essays, the legal aspects to consider when negotiating contracts with vendors, reviews of current products and speculations about future trends.

If you're an MIS executive, DP manager, Supervisor or Programmer, you'll find our June 30th report especially valuable. If you market systems or utility software—your ad should be there. Don't forget, ads must be received by June 13th. To reserve space, call your **Computerworld** sales representative or Frank Collins at (617) 879-0700.

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Mini, Small Business Computer Users . . .

Survey Item / Manufacturer and Model	AM Jacquard	Basic Four	BTI	Burroughs	CHI	Control Data	Dta General	Datapoint	DEC	Digital Scientific Corp.	Educational Data Systems	Four Phase
No. of User Responses	4	45	7	62	4	3	149	79	412	5	6	36
No. of Systems Represented	4	48	15	87	6	4	205	140	791	5	6	119
Avg. Life of System (Mos.)	22.3	25.9	27.0	28.9	52.0	26.0	23.0	22.0	34.6	44.8	6.7	30.5
Acquisition Method (%)	100	71	57	69	25	67	84	46	88	80	100	12
Purchase	0	6	0	13	0	0	1	9	1	0	0	32
Rental	0	23	43	18	75	33	15	45	10	20	0	51
Lease												
Principal Applications (%)	75	75	57	73	50	0	49	56	41	60	67	61
Accounting	0	5	29	4	0	0	6	5	4	0	0	0
Construction	0	0	0	1	0	0	7	1	15	60	0	4
Education	0	2	0	7	0	0	5	6	15	0	0	7
Government	0	33	29	25	50	0	14	10	9	40	17	17
Manufacturing	25	46	57	48	50	0	25	22	20	60	33	24
Payroll/Personnel	25	4	43	7	0	0	8	9	10	20	17	13
Service Bureaus	0	2	14	1	25	0	1	4	2	0	0	3
Transportation	75	6	14	1	0	0	14	13	17	20	50	10
Word Processing	0	10	14	11	0	33	3	7	5	0	0	0
Banking/Finance	0	9	0	5	0	0	9	29	11	20	0	15
Distributed Processing	0	0	14	1	25	0	24	11	28	20	0	0
Engineering/Scientific	0	2	0	3	0	0	3	2	0	0	17	4
Insurance	0	2	0	7	0	0	10	5	8	0	0	33
Medical/Health Care	0	23	0	6	0	0	6	11	2	0	17	0
Retail	0	21	0	9	25	0	16	20	9	0	0	20
Transaction Processing	0	0	0	4	0	33	4	2	3	0	0	0
Utilities-Power	0	20	0	16	25	33	23	24	27	20	17	17
Other												
Source of Applications Prog. (%)	50	57	71	35	75	100	77	80	77	100	83	54
In-house personnel	50	24	43	49	50	33	15	28	23	20	0	28
"Ready-made" programs from manufacturer	25	55	57	47	0	0	30	25	17	0	33	19
Contract Programming	25	0	0	5	0	67	6	1	6	0	0	6
Manfacturer's Personnel	25	33	14	23	25	0	26	21	33	20	33	35
Proprietary Software Packages	0	0	0	2	25	0	0	4	5	20	0	0
Other												
Hardware Configuration	4	38	15	87	6	4	121	225	925	5	6	119
No. of CPUs	3.5	3.3	5.1	6.0	17.0	8.0	6.4	2.8	7.4	4.8	6.0	3.9
No. of Workstations (avg.)												
Software Configuration	50	7	85	8	25	67	23	4	14	0	0	15
DBMS (%)	0	4	14	23	25	67	20	20	16	20	0	22
Datacomm monitors (%)												
Primary Programming Language	0	0	0	0	0	33	5	2	0	0	0	3
APL	100	79	100	0	0	0	25	2	34	0	100	0
BASIC	0	0	0	75	0	33	31	11	11	0	0	32
COBOL	0	0	0	0	75	67	31	0	29	60	0	0
FORTRAN	0	0	0	18	25	33	0	13	1	0	0	0
RPG	25	3	0	2	0	0	25	75	56	60	0	53
Other												
Planned Acquisitions/Implementations for 1980 (%)	50	9	0	14	25	33	19	21	23	0	0	33
Additional software from manufacturer	25	22	14	19	0	0	41	17	27	60	50	20
Proprietary Software	75	26	29	29	25	33	29	32	30	80	17	14
Expanded Datacomm	0	7	0	3	0	0	8	21	8	0	0	18
Distributed Processing	0	16	0	8	0	0	16	27	14	0	50	31
Integrated Word Processing	25	19	14	16	0	33	9	17	12	0	17	9
Other												
Plans for system replacement in 1980 (%)	0	16	0	12	0	0	8	16	20	20	0	20
Yes, same manufacturer	0	11	29	24	0	0	15	6	6	20	0	19
Yes, different manufacturer	100	73	71	60	100	100	77	66	66	40	83	62
No												

Manufacturer and Model / Survey Item	AM Jacquard	Basic Four	BTI	Burroughs	CHI	Control Data	Dta General	Datapoint	DEC	Digital Scientific Corp.	Educational Data Systems	Four Phase
Significant Problems (%)												
System proposed by vendor was too small	25	24	29	21	0	0	24	19	11	0	0	9
Delivery and/or installation of equipment was late	25	4	0	33	0	33	29	25	26	20	0	24
Delivery of required software was late	25	15	29	28	0	67	22	18	13	0	0	16
System costs exceeded expected total	25	20	29	5	0	33	10	7	8	0	0	18
Vendor did not provide all promised software or support	25	21	0	42	0	0	25	13	13	20	0	30
Program/data compatibility not what vendor promised	0	2	0	13	0	0	11	3	4	0	0	6
Terminals/peripherals compatibility not what vendor promised	25	2	0	10	0	0	6	1	4	0	17	2
Vendor enhancements/changes to hardware software hard to keep up with	0	4	0	16	0	0	10	6	9	40	0	11
Equipment excessively noisy	0	9	14	10	0	0	8	5	9	20	0	0
Power/Cooling requirements excessive	0	4	0	2	0	0	4	1	3	0	0	2
Other	0	17	14	21	25	0	15	15	11	20	0	15
Significant Advantages (%)												
Users happy with response time	75	55	43	24	50	100	36	37	40	40	100	41
System easy to expand/reconfigure	75	65	43	42	50	0	57	67	54	40	100	30
System costs less than expected	0	13	0	3	50	0	4	14	7	20	0	2
Programs/data compatible, as vendor promised	50	18	14	12	75	0	25	31	19	40	50	13
Terminals/peripherals compatible, as vendor promised	0	22	71	9	75	0	15	13	27	40	50	3
System is power/energy efficient	0	20	57	9	50	33	20	28	12	0	17	12
Productivity aids help us keep programming costs down	50	19	14	15	50	0	26	25	20	0	33	29
Database language effective	25	25	43	2	50	0	15	8	14	0	17	9
Delivery and/or installation of equipment was ahead of schedule	25	12	0	9	50	0	7	8	7	20	33	8
Delivery and/or installation of software was ahead of schedule	0	12	0	9	50	0	4	3	5	20	17	2
Other	25	11	14	9	0	0	6	9	6	0	0	12
System Ratings (4.0-0.0)												
Ease of operation	3.8	3.7	3.4	3.2	3.5	3.0	3.3	3.4	3.3	3.0	4.0	3.2
Reliability of Mainframe	3.3	3.3	3.6	2.9	3.8	3.7	3.4	3.3	3.5	3.0	3.8	3.5
Reliability of Peripherals	3.3	3.2	3.1	2.6	3.3	3.3	3.0	3.8	3.1	2.5	3.7	3.2
Maintenance service:												
Responsiveness	3.3	3.2	3.6	2.6	3.3	3.3	2.6	3.1	2.9	3.2	3.5	3.1
Effectiveness	3.3	3.1	3.3	2.6	3.3	2.7	2.8	2.7	2.9	2.6	3.3	2.9
Technical support:												
Trouble-shooting	3.0	2.6	3.1	1.9	2.8	2.0	2.4	2.5	2.7	2.5	3.5	2.6
Education	2.3	2.7	2.4	2.1	2.8	2.3	2.4	2.4	2.6	2.0	3.3	2.4
Documentation	2.6	2.7	3.0	2.2	2.3	4.0	2.3	2.5	2.7	2.0	2.7	2.6
Manufacturer's software:												
Operating system	3.8	3.4	2.9	3.1	3.0	2.3	3.0	3.3	3.2	2.3	3.8	3.1
Compilers & Assemblers	3.8	3.1	2.5	2.7	3.0	2.3	3.0	3.3	3.1	3.0	3.6	3.1
Applications Programs	3.0	3.0	3.2	2.5	2.7	2.7	2.6	2.6	2.9	3.5	3.7	2.9
Ease of programming	3.5	3.6	3.4	2.5	2.8	2.3	3.1	3.2	3.1	3.2	4.0	2.9
Ease of conversion	2.8	3.0	3.0	2.1	2.8	1.3	2.8	3.0	2.9	3.4	4.0	2.7
Overall satisfaction	3.3	3.2	3.3	2.5	2.8	3.0	3.0	3.1	3.1	2.8	4.0	2.9
Would you recommend system to another user? (%)												
Yes	100	81	71	54	100	67	73	84	82	60	100	82
No	0	19	14	46	0	63	27	16	16	20	0	18

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. . . Rate the Makers of Their Machines

Survey Item	General Automation	Harris	Hewlett-Packard	Honeywell	IBM	Lockheed	Microdata	Minicomputer Systems MICOS 200	Modcomp	NCR	Nixdorf	Perkin-Elmer
No. of User Responses	17	8	149	75	802	5	48	5	12	73	8	11
No. of Systems Represented	22	9	191	83	960	5	54	5	32	109	5	5
Avg. Life of System (Mos.)	54.3	29.0	23.9	20.1	53.1	53.0	27.4	27.2	20.7	41.7	20.0	38.7
Acquisition Method (%)												
Purchase	86	63	77	49	83	60	81	80	93	64	60	100
Rental	0	0	2	14	18	0	0	0	0	20	40	0
Lease	13	37	20	37	29	40	9	20	7	16	0	0
Principal Applications (%)												
Accounting	46	37	51	70	68	60	80	100	24	62	40	47
Construction	8	0	2	7	6	40	2	0	8	3	0	0
Education	4	37	21	6	7	0	12	0	0	4	0	0
Government	0	25	7	0	6	20	7	20	31	4	0	0
Manufacturing	28	0	19	32	28	0	36	20	11	18	20	9
Payroll/Personnel	36	37	29	44	58	40	58	40	7	54	0	9
Service Bureaus	0	0	17	7	9	20	27	20	15	6	0	9
Transportation	4	0	4	2	4	0	13	0	8	0	0	0
Word Processing	8	13	17	2	3	0	14	20	0	2	0	10
Banking/Finance	0	13	9	4	9	0	3	0	0	22	0	0
Distributed Processing	7	25	13	14	7	0	16	20	7	3	20	9
Engineering/Scientific	47	13	19	1	6	0	1	0	41	0	0	17
Insurance	0	0	3	5	3	0	1	0	7	3	0	10
Medical/Health Care	0	0	3	8	4	0	3	0	7	8	0	0
Retail	4	0	3	9	5	0	22	0	0	9	0	9
Transaction Processing	13	13	2	16	13	0	20	0	7	10	20	19
Utilities-Power	0	13	1	5	2	0	2	0	0	4	0	0
Other	15	13	8	16	12	0	32	20	22	11	0	0
Source of Applications Prog. (%)												
In-house personnel	100	100	35	76	88	80	83	40	100	52	60	82
"Ready-made" programs from manufacturer	28	25	33	21	29	0	5	20	19	49	100	9
Contract Programming	25	0	27	23	25	40	58	40	0	18	20	25
Manufacturer's Personnel	4	0	1	18	6	0	3	0	0	17	20	0
Proprietary Software Packages	32	37	44	22	2	60	36	40	18	23	40	25
Other	0	0	3	2	1	0	1	0	0	0	0	0
Hardware Configuration												
No. of CPUs	22	8	200	83	930	5	53	5	31	96	5	26
No. of Workstations (avg.)	4.0	7.3	11.6	8.1	2.4	1	9.2	4.2	2.2	2.1	4.4	69.0
Software Configuration												
DBMS (%)	22	50	57	13	1	0	47	20	33	0	0	0
Datacomm monitors (%)	15	25	36	31	1	0	8	20	39	0	0	0
Primary Programming Language												
APL	0	0	1	0	1	0	0	0	0	0	0	0
BASIC	4	37	46	5.0	2	0	93	100	0	3	80	10
COBOL	7	75	46	82	11	0	0	0	0	33	0	17
FORTRAN	77	37	33	7	11	0	0	0	92	0	0	36
RPG	4	13	19	23	54	80	3	0	0	0	0	9
Other	13	13	17	5	11	0	46	0	0	75	20	0
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	0	13	36	12	10	0	18	0	7	16	40	19
Proprietary Software	8	25	35	29	8	0	21	20	0	5	20	29
Expanded Datacomm	15	25	29	30	18	20	40	20	33	8	40	27
Distributed Processing	8	0	18	24	15	0	14	40	24	1	0	0
Integrated Word Processing	4	0	14	6	8	0	14	20	13	0	0	0
Other	0	0	8	5	8	0	4	40	0	2	0	0
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	8	0	6	5	26	0	3	0	15	20	0	18
Yes, different manufacturer	38	13	3	8	11	0	14	20	0	17	20	27
No	45	87	86	41	56	100	81	80	85	53	80	64

Survey Item	General Automation	Harris	Hewlett-Packard	Honeywell	IBM	Lockheed	Microdata	Minicomputer Systems MICOS 200	Modcomp	NCR	Nixdorf	Perkin-Elmer
Significant Problems (%)												
System proposed by vendor was too small	18	13	10	59	14	0	25	20	11	11	20	27
Delivery and/or installation of equipment was late	28	25	10	13	8	0	6	0	8	29	0	17
Delivery of required software was late	37	0	13	32	7	0	18	0	8	19	0	17
System costs exceeded expected total	7	0	6	21	7	20	6	0	11	13	0	19
Vendor did not provide all promised software or support	48	25	10	32	7	0	33	20	33	27	0	9
Program/data compatibility not what vendor promised	7	0	0	9	2	0	2	0	8	7	20	0
Terminals/peripherals compatibility not what vendor promised	0	0	6	5	2	20	2	20	0	6	0	0
Vendor enhancements/changes to hardware/software hard to keep up with	11	13	15	17	7	20	7	0	26	8	20	9
Equipment excessively noisy	4	13	0	4	8	0	0	0	0	17	0	9
Power/Cooling requirements excessive	11	0	5	7	5	0	1	0	0	5	0	0
Other	22	13	18	8	17	0	13	0	18	14	0	28
Significant Advantages (%)												
Users happy with response time	17	75	55	45	29	0	56	20	28	25	0	20
System easy to expand/reconfigure	23	37	65	67	28	20	62	60	46	23	40	27
System costs less than expected	4	13	12	7	5	0	3	20	8	2	60	0
Programs/data compatible, as vendor promised	40	50	27	26	22	0	10	20	43	25	0	20
Terminals/peripherals compatible, as vendor promised	19	25	15	11	12	0	6	40	41	8	0	20
System is power/energy efficient	0	0	28	21	12	0	38	0	20	10	0	10
Productivity aids help us keep programming costs down	8	25	37	26	18	20	42	20	13	5	0	0
Database language effective	0	25	54	7	4	0	86	20	31	9	40	0
Delivery and/or installation of equipment was ahead of schedule	7	0	18	8	7	0	26	20	13	9	20	0
Delivery and/or installation of software was ahead of schedule	4.3	0	7	5	4	0	12	0	7	1	0	0
Other	0	0	3	6	7	0	3	20	0	4	0	10
System Ratings (4.0-0.0)												
Ease of operation	2.8	3.3	3.6	3.1	3.3	3.4	3.7	3.4	3.0	3.1	3.4	3.0
Reliability of Mainframe	3.1	3.0	3.6	3.1	2.6	2.6	3.5	3.0	3.6	3.3	3.6	3.3
Reliability of Peripherals	2.7	3.0	3.3	3.0	3.3	3.0	3.1	2.8	2.8	3.1	3.4	3.1
Maintenance service:												
Responsiveness	2.9	3.3	3.1	3.0	3.1	2.4	2.9	2.0	2.1	3.1	3.0	3.3
Effectiveness	2.9	2.8	3.0	2.8	3.2	2.8	2.9	2.4	2.7	3.1	3.0	2.7
Technical support:												
Trouble-shooting	1.8	2.5	2.9	2.6	2.9	1.8	2.9	2.4	2.3	2.7	2.8	2.5
Education	1.6	2.4	2.9	2.3	2.8	1.6	2.3	2.8	2.5	2.6	2.6	2.2
Documentation	1.6	1.9	2.8	2.2	2.7	1.6	2.3	2.8	2.3	2.7	2.8	1.9
Manufacturer's software:												
Operating system	2.5	2.9	3.4	3.1	3.2	2.8	3.5	3.6	3.0	3.0	2.4	2.6
Compilers & Assemblers	2.7	2.9	3.1	3.1	3.2	2.8	3.3	2.5	2.9	2.9	3.0	2.8
Applications Programs	2.6	2.3	2.9	2.8	2.8	2.8	3.0	3.3	2.7	2.6	3.4	2.4
Ease of programming	2.5	3.1	3.3	3.0	3.0	2.5	3.6	3.6	2.7	2.9	3.3	2.7
Ease of conversion	2.5	2.9	3.0	2.7	2.7	4.0	3.3	3.0	2.2	2.4	3.0	2.7
Overall satisfaction	2.3	3.1	3.4	2.9	3.1	2.6	3.4	3.0	2.7	3.0	3.0	3.1
Would you recommend system to another user? (%)												
Yes	40	75	87	75	72	60	83	80	69	58	80	84
No	56	13	11	24	26	40	17	20	31	42	20	17

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Mini Users Rate Their Vendors . . .

Survey Item / Manufacturer and Model	Phillips	Pick & Associates	Prime	Qantel	SEL	Tandem	Texas Instruments	Univac	Wang Labs	Minis & SBCs (all other models)
No. of User Responses	2	3	39	13	3	10	51	41	78	50
No. of Systems Represented	4	7	50	13	14	17	71	48	155	107
Avg. Life of System (Mos.)	41.0	31.0	9.9	24.9	49.3	15.7	91.0	69.9	23.3	25.3
Acquisition Method (%)										
Purchase	100	100	63	74	67	60	87	65	75	78
Rental	0	0	0	10	0	0	1	5	11	6
Lease	0	0	33	6	33	40	12	28	11	16
Principal Applications (%)										
Accounting	50	100	34	84	0	10	73	67	53	52
Construction	0	0	38	0	0	0	11	4	11	4
Education	0	67	22	0	0	10	2	3	4	4
Government	0	0	8	0	100	0	0	19	3	4
Manufacturing	0	67	20	29	0	0	17	15	16	16
Payroll/Personnel	100	67	27	43	0	20	41	42	37	40
Service Bureaus	0	67	16	0	0	0	20	7	10	8
Transportation	0	0	0	10	0	0	3	5	1	2
Word Processing	0	67	23	35	0	20	52	8	27	32
Banking/Finance	0	33	9	0	0	30	12	5	12	4
Distributed Processing	0	0	6	10	33	10	8	4	3	10
Engineering/Scientific	0	0	21	0	67	10	2	7	12	14
Insurance	0	33	7	6	0	0	1	9	8	4
Medical/Health Care	0	0	4	0	0	10	13	4	2	12
Retail	0	67	6	0	0	0	175	5	11	4
Transaction Processing	0	0	10	20	0	50	8	11	12	8
Utilities-Power	50	0	0	0	0	0	2	0	0	2
Other	0	33	0	35	0	0	10	6	16	32
Source of Applications Prog. (%)										
In-house personnel	0	100	85	72	67	70	67	68	60	64
"Ready-made" programs from manufacturer	0	33	19	48	0	20	3	13	20	44
Contract Programming	50	0	25	45	67	50	23	19	39	24
Manfacturer's Personnel	50	0	0	10	0	0	0	13	0	2
Proprietary Software Packages	0	33	45	39	0	50	39	17	32	8
Other	0	0	0	0	0	0	2	0	5	0
Hardware Configuration										
No. of CPUs	3	7	48	13	14	60	69	12	55	119
No. of Workstations (avg.)	0	12.8	5.6	3.9	4.2	51.2	97.5	2.2	3.9	9.3
Software Configuration										
DBMS (%)	0	100	0	10	0	0	0	14	19	12
Datacomm monitors (%)	0	67	0	0	33	0	0	18	7	8
Primary Programming Language										
APL	0	0	0	0	0	0	0	0	0	2
BASIC	0	67	17	74	0	0	43	0	68	30
COBOL	0	0	30	0	0	50	30	15	14	18
FORTRAN	0	0	37	0	100	10	5	9	0	24
RPG	0	0	7	0	0	0	8	65	5	14
Other	0	0	0	20	67	0	0	24	11	36
Planned Acquisitions/Implementations for 1980 (%)										
Additional software from manufacturer	0	0	24	13	0	50	22	22	17	24
Proprietary Software	0	33	35	13	0	20	41	4	21	14
Expanded Datacomm	0	33	30	10	0	70	28	16	27	26
Distributed Processing	0	0	11	0	0	20	22	2	13	10
Integrated Word Processing	0	0	13	6	0	10	60	4	16	24
Other	0	0	0	0	0	0	6	0	15	12
Plans for system replacement in 1980 (%)										
Yes, same manufacturer	0	0	14	6	0	0	17	10	6	8
Yes, different manufacturer	100	0	0	0	0	0	0	35	10	22
No	0	100	82	88	100	100	79	66	78	70

Survey Item / Manufacturer and Model	Phillips	Pick & Associates	Prime	Qantel	SEL	Tandem	Texas Instruments	Univac	Wang Labs	Minis & SBCs (all other models)
Significant Problems (%)										
System proposed by vendor was too small	50	0	27	26	67	10	1	28	12	20
Delivery and/or installation of equipment was late	50	0	4	6	33	0	1	10	12	18
Delivery of required software was late	50	0	6	23	33	0	13	10	8	12
System costs exceeded expected total	0	0	0	0	0	10	0	5	9	10
Vendor did not provide all promised software or support	0	0	8	23	33	30	6	18	20	16
Program/data compatibility not what vendor promised	0	0	11	6	0	10	2	4	6	6
Terminals/peripherals compatibility not what vendor promised	0	0	2	0	33	0	0	6	4	2
Vendor enhancements/changes to hardware software hard to keep up with	0	0	2	5	0	20	5	9	8	10
Equipment excessively noisy	50	0	5	0	33	0	1	35	13	8
Power/Cooling requirements excessive	0	0	5	0	0	0	0	24	3	12
Other	0	0	16	25	0	0	26	17	17	26
Significant Advantages (%)										
Users happy with response time	50	100	67	68	0	40	66	23	45	46
System easy to expand/reconfigure	0	100	87	94	33	90	53	16	50	44
System costs less than expected	50	33	6	6	0	0	19	2	8	10
Programs/data compatible, as vendor promised	0	33	41	30	0	0	24	19	18	28
Terminals/peripherals compatible, as vendor promised	0	33	33	20	33	10	27	9	8	26
System is power/energy efficient	0	0	31	33	0	30	43	2	21	16
Productivity aids help us keep programming costs down	0	100	25	43	0	50	49	17	32	12
Database language effective	0	100	28	55	0	60	16	4	8	18
Delivery and/or installation of equipment was ahead of schedule	50	33	17	6	0	40	19	7	9	6
Delivery and/or installation of software was ahead of schedule	0	0	11	6	0	0	17	5	4	4
Other	50	0	4	5	0	20	2	5	6	8
System Ratings (0.0-9.0)										
Ease of operation	3.5	4.0	3.8	3.6	1.7	3.6	3.8	3.0	3.7	3.3
Reliability of Mainframe	2.5	3.7	3.7	3.5	3.7	3.9	3.6	2.8	3.4	3.2
Reliability of Peripherals	2.0	3.3	3.1	3.1	2.3	3.3	3.6	2.6	3.2	3.0
Maintenance service:										
Responsiveness	3.0	3.7	3.2	3.4	1.3	3.4	3.1	2.8	2.8	2.8
Effectiveness	2.5	3.7	3.0	3.3	2.0	4.0	2.8	2.6	2.9	2.8
Technical support:										
Trouble-shooting	2.5	4.0	3.1	3.0	1.5	3.1	3.1	2.3	2.6	2.6
Education	1.5	3.3	2.5	2.3	2.3	3.2	2.6	2.0	2.2	2.3
Documentation	2.0	3.0	2.6	2.7	1.3	2.9	3.1	2.0	2.5	2.2
Manufacturer's software:										
Operating system	3.0	4.0	3.6	3.5	1.7	3.7	3.6	2.8	3.3	3.2
Compilers & Assemblers	2.0	4.0	3.3	3.4	2.3	3.6	3.2	2.1	3.4	3.2
Applications Programs	2.0	4.0	2.9	3.1	1.0	3.2	3.2	2.3	2.7	2.9
Ease of programming	1.0	3.7	3.5	3.7	1.6	3.3	3.6	2.6	3.5	3.1
Ease of conversion	1.0	3.3	3.0	3.4	1.5	3.0	3.2	2.8	3.1	3.0
Overall satisfaction	2.0	4.0	3.3	3.4	2.0	3.8	3.5	2.6	3.3	3.1
Would you recommend system as another user? (%)										
Yes	0	100	95.3	80	33	100	98	38	87	80
No	100	0	4.7	20	33	0	2	54	13	18

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. . . And Then Rate Their Machines

Survey Item	AM Jacquard J100 & J500	Basic Four Models 400 & 410	Basic Four Models 600 & 610	Basic Four (other models)	BTI (all models)	Burroughs B700 Series	Burroughs B80	Burroughs B800	CHI (all models)	Control Data Cyber 18 & 1700	Data General CS Series	Data General Eclipse C Series
No. of User Responses	4	18	17	10	7	23	10	28	4	3	18	33
No. of Systems Represented	4	18	18	12	18	28	11	48	6	4	17	41
Avg. Life of System (Mos.)	22.3	23.9	20.6	33.2	27.0	42.4	26.5	17.8	61.5	26.0	10.7	21.7
Acquisition Method (%)												
Purchase	100	61	71	80	57	65	70	72	25	67	67	85
Rental	0	0	6	10	0	9	20	10	0	0	0	0
Lease	0	39	22	10	43	26	10	17	75	33	13	15
Principal Applications (%)												
Accounting	75	67	88	70	57	65	70	83	50	0	93	42
Construction	0	5	0	10	29	4	0	7	0	0	0	3
Education	0	0	0	0	0	4	0	0	0	0	0	12
Government	0	0	6	0	0	9	10	3	0	0	7	6
Manufacturing	0	39	29	30	29	30	10	35	50	0	20	9
Payroll/Personnel	25	28	41	70	57	65	30	48	50	0	47	18
Service Bureaus	25	11	0	0	43	0	0	21	0	0	13	6
Transportation	0	0	6	0	14	0	0	3	25	0	0	0
Word Processing	75	11	6	0	14	4	0	0	0	0	0	15
Banking/Finance	0	5	6	20	14	13	10	10	0	33	7	3
Distributed Processing	0	5	12	10	0	4	0	10	0	0	7	3
Engineering/Scientific	0	0	0	0	14	4	0	0	25	0	0	18
Insurance	0	0	6	0	0	0	10	0	0	0	0	15
Medical/Health Care	0	5	0	0	0	4	10	7	0	0	13	15
Retail	0	5	24	40	0	9	0	10	0	0	13	6
Transaction Processing	0	5	29	30	0	9	0	17	25	0	13	30
Utilities-Power	0	0	0	0	0	4	0	7	0	33	7	3
Other	0	33	6	20	0	13	20	14	25	33	13	27
Source of Application Prog. (%)												
In-house personnel	50	61	59	50	71	35	30	41	75	100	67	79
"Ready-made" programs from manufacturer	50	44	18	10	43	43	60	45	50	33	27	6
Contract Programming	25	44	71	50	57	52	40	48	0	0	40	30
Manufacturer's Personnel	25	0	0	0	0	4	0	10	0	67	7	0
Proprietary Software Packages	25	17	53	30	14	4	20	45	25	0	33	30
Other	0	0	0	0	0	4	0	3	25	0	0	0
Hardware Configuration												
No. of CPUs	4	18	18	12	15	28	11	48	6	4	17	41
No. of Workstations (avg.)	3.5	2.3	4.2	3.5	5.1	0.4	11.0	5.0	17.0	8.0	4.1	12.3
Software Configuration												
DBMS (%)	50	0	12	10	86	0	10	14	25	67	13	82
Datacomm monitors (%)	0	6	6	0	14	4	10	56	25	67	27	36
Primary Programming Language												
API	0	0	0	0	0	0	0	0	0	33	0	0
BASIC	100	67	88	80	100	0	0	0	0	0	0	15
COBOL	0	0	0	0	0	43	90	93	0	33	100	64
FORTRAN	0	0	0	0	0	0	0	0	75	67	0	27
RPG	0	0	0	0	0	13	20	20	25	33	0	0
Other	25	0	0	10	0	0	0	7	0	0	0	55
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	50	6	12	10	0	0	20	21	25	33	13	21
Proprietary Software	25	17	29	20	14	22	10	24	0	0	40	15
Expanded Datacomm	75	17	53	10	29	4	30	52	25	33	40	33
Distributed Processing	0	6	6	10	0	0	0	10	0	0	20	6
Integrated Word Processing	0	22	18	30	0	0	10	14	0	0	13	15
Other	25	11	6	40	14	39	0	10	0	33	7	15
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	0	11	18	20	0	13	10	14	0	0	13	9
Yes, different manufacturer	0	11	12	10	29	48	10	14	0	0	13	6
No	100	78	71	70	71	39	80	69	100	100	80	76

Survey Item	AM Jacquard J100 & J500	Basic Four Models 400 & 410	Basic Four Models 600 & 610	Basic Four (other models)	BTI (all models)	Burroughs B700 Series	Burroughs B80	Burroughs B800	CHI (all models)	Control Data Cyber 18 & 1700	Data General CS Series	Data General Eclipse C Series
Significant Problems (%)												
System proposed by vendor was too small	25	17	35	20	29	9	20	35	0	0	20	21
Delivery and/or installation of equipment was late	25	6	6	0	0	9	50	41	0	33	47	12
Delivery of required software was late	25	17	18	10	25	9	30	45	0	67	20	6
System costs exceeded expected total	25	6	24	30	29	0	10	3	0	33	7	6
Vendor did not provide all promised software or support	25	28	24	10	0	48	40	38	0	0	33	9
Program/data compatibility not what vendor promised	0	6	0	0	0	13	10	17	0	0	0	3
Terminals/peripherals compatibility not what vendor promised	25	0	6	0	0	4	10	17	0	0	0	6
Vendor enhancements/changes to hardware/software hard to keep up with	0	0	12	0	0	13	20	14	0	0	13	9
Equipment excessively noisy	0	6	12	10	14	9	10	10	0	0	13	6
Power/Cooling requirements excessive	0	11	0	0	0	0	0	7	0	0	20	6
Other	0	22	18	10	14	22	30	10	21	0	27	30
Significant Advantages (%)												
Users happy with response time	75	56	59	50	43	17	20	35	50	100	27	36
System easy to expand/reconfigure	75	39	76	80	43	17	50	59	50	0	53	61
System costs less than expected	0	22	6	10	0	0	0	10	50	0	0	6
Programs/data compatible, as vendor promised	50	6	29	20	14	4	10	21	75	0	33	15
Terminals/peripherals compatible, as vendor promised	0	11	24	30	71	0	10	17	75	0	0	6
System is power/energy efficient	0	22	18	0	57	1	10	17	50	33	13	9
Productivity aids help us keep programming costs down	50	17	29	10	14	0	20	24	50	0	33	21
Database language effective	25	17	18	40	43	0	0	7	50	0	13	24
Delivery and/or installation of equipment was ahead of schedule	25	11	6	20	0	9	10	7	50	0	0	21
Delivery and/or installation of software was ahead of schedule	0	11	6	20	0	9	10	7	50	0	0	15
Other	25	6	6	20	14	17	10	0	0	0	7	12
System Ratings (1.0-5.0)												
Ease of operation	3.8	3.5	3.8	3.9	3.4	3.1	3.5	3.1	3.5	3.0	3.1	3.3
Reliability of Mainframe	3.3	3.5	3.4	3.0	3.6	3.1	2.6	2.9	3.8	3.7	3.1	3.6
Reliability of Peripherals	3.3	3.0	3.9	2.8	3.1	2.5	2.3	2.7	3.3	3.3	2.8	3.3
Maintenance service:												
Responsiveness	3.3	3.3	3.5	2.9	3.6	2.5	2.7	2.5	3.3	3.3	2.9	2.9
Effectiveness	3.3	3.2	3.2	2.8	3.3	2.7	2.8	2.4	3.3	2.7	2.7	3.1
Technical support:												
Trouble-shooting	3.0	2.6	2.8	2.3	3.1	1.9	1.9	1.9	2.8	2.0	2.1	2.4
Education	2.3	2.6	2.7	2.8	2.4	1.9	2.3	2.1	2.8	2.3	2.4	2.3
Documentation	2.6	2.4	2.7	3.1	3.0	1.7	2.7	2.1	2.3	4.0	2.6	2.2
Manufacturer's software:												
Operating system	3.8	3.2	3.3	3.8	2.9	2.7	3.6	3.0	3.0	2.3	2.9	2.9
Compilers & Assemblers	3.8	3.1	3.3	3.0	2.5	2.4	3.2	2.6	3.0	2.3	2.9	3.1
Applications Programs	3.0	2.8	2.8	3.3	3.2	2.9	2.4	2.5	2.7	2.7	2.6	2.9
Ease of programming	3.5	3.4	3.8	3.7	3.4	2.3	2.5	2.8	2.8	2.3	3.1	3.1
Ease of conversion	2.8	2.6	2.9	3.4	3.0	1.7	2.3	2.3	2.8	1.3	2.8	2.9
Overall satisfaction	3.3	3.2	3.2	3.3	3.3	2.4	2.6	2.5	2.8	3.0	3.0	3.1
Would you recommend system to another user? (%)												
Yes	100	72	82	90	71	43	80	58	100	67	79	81
No	0	28	18	10	14	52	40	42	0	33	21	19

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Mini, Small Business Computer Users . . .

Survey Item / Manufacturer and Model	Datapoint 5500	Datapoint 6600	Datapoint ARC	DEC Datasystem (all models)	DEC PDP-8	DEC PDP-11/03	DEC PDP-11/04, 05	DEC PDP-11/10 thru 11/23	DEC PDP-11/34	DEC PDP-11/35	DEC PDP-11/40	DEC PDP-11/45
No. of User Responses	16	13	15	17	24	16	9	8	99	8	22	20
No. of Systems Represented	32	17	32	18	32	18	21	9	142	18	24	63
Avg. Life of System (Mos.)	28.3	23.2	17.1	20.3	53.8	18.3	50.0	54.4	24.1	30.0	53.8	53.4
Acquisition Method (%)												
Purchase	31	62	40	71	96	87	100	63	84	100	77	90
Rental	25	0	13	0	0	0	0	0	0	0	0	0
Lease	44	38	40	24	4	13	0	13	14	0	23	10
Principal Applications (%)												
Accounting	63	69	67	82	58	40	33	50	52	63	55	35
Construction	0	15	0	6	8	7	0	0	3	13	0	5
Education	0	0	7	0	25	13	11	13	10	0	23	20
Government	13	15	0	0	0	0	0	0	3	25	9	25
Manufacturing	19	15	13	0	13	7	11	0	14	13	14	5
Payroll/Personnel	19	31	40	29	38	7	22	25	28	38	27	15
Service Bureaus	0	0	13	24	4	13	11	13	13	13	14	15
Transportation	0	15	13	0	4	7	0	0	2	0	5	5
Word Processing	0	8	13	12	25	7	22	0	15	25	14	35
Banking/Finance	0	15	13	0	0	0	0	13	4	0	5	5
Distributed Processing	31	15	53	0	8	7	0	13	8	13	9	10
Engineering/Scientific	0	39	0	0	4	33	11	25	21	0	23	40
Insurance	0	0	13	0	0	0	0	0	1	0	0	0
Medical/Health Care	6	23	0	6	8	13	0	0	10	13	14	5
Retail	13	23	7	6	4	0	0	0	1	0	5	5
Transaction Processing	25	39	40	6	12	0	11	0	10	13	23	15
Utilities-Power	0	0	0	0	0	7	0	0	1	0	9	5
Other	25	39	13	18	17	27	22	13	25	50	9	133
Source of Applications Prog. (%)												
In-house personnel	94	100	100	71	46	80	89	88	73	63	96	100
"Ready-made" programs from manufacturer	13	23	27	18	25	7	22	0	10	25	18	25
Contract Programming	25	31	27	12	38	7	33	13	20	25	14	25
Manufacturer's Personnel	0	0	0	0	4	0	11	0	1	13	0	10
Proprietary Software Packages	0	31	20	53	33	13	33	13	34	38	32	50
Other	0	8	0	6	8	7	11	13	4	0	0	0
Hardware Configuration												
No. of CPUs	32	30	100	18	33	18	35	9	165	20	24	63
No. of Workstations (avg.)	4.3	4.4	3.3	2.2	2.1	1.3	8.2	2.4	5.2	17.0	15.2	4.2
Software Configuration												
DBMS (%)	0	15	0	18	88	13	22	25	22	75	46	35
Datacomm monitors (%)	31	23	27	18	8	0	22	25	12	50	18	15
Primary Programming Language												
APL	0	0	0	0	0	0	0	0	0	0	0	0
BASIC	0	0	13	24	21	40	22	13	43	75	64	40
COBOL	6	46	27	0	4	0	0	0	8	13	14	30
FORTRAN	0	0	0	0	17	20	22	38	31	0	23	30
RPG	19	31	7	0	0	0	0	0	0	13	0	0
Other	81	92	87	88	79	40	89	75	52	50	27	35
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	19	46	13	12	8	27	33	13	19	25	23	30
Proprietary Software	0	31	20	29	17	13	33	25	21	50	23	40
Expanded Datacomm	13	39	33	18	13	27	44	13	22	25	41	35
Distributed Processing	13	31	20	0	4	0	0	0	8	0	9	10
Integrated Word Processing	19	8	47	24	13	13	22	0	16	25	5	15
Other	19	15	7	0	17	7	22	0	0	38	9	10
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	25	0	0	18	21	27	22	13	19	25	27	25
Yes, different manufacturer	19	0	7	12	17	7	0	13	8	0	9	10
No	50	100	93	71	13	53	33	50	67	63	64	65

Survey Item / Manufacturer and Model	Datapoint 5500	Datapoint 6600	Datapoint ARC	DEC Datasystem (all models)	DEC PDP-8	DEC PDP-11/03	DEC PDP-11/04, 05	DEC PDP-11/10 thru 11/23	DEC PDP-11/34	DEC PDP-11/35	DEC PDP-11/40	DEC PDP-11/45
Significant Problems (%)												
System proposed by vendor was too small	25	23	20	12	8	0	22	13	21	0	23	20
Delivery and/or installation of equipment was late	13	15	33	24	17	47	22	13	31	13	27	30
Delivery of required software was late	19	31	7	6	13	7	0	0	16	38	14	25
System costs exceeded expected total	6	0	7	12	13	0	0	13	12	13	14	5
Vendor did not provide all promised software or support	19	39	7	18	17	0	0	13	17	25	14	10
Program/data compatibility not what vendor promised	0	0	0	0	4	0	0	13	5	0	9	0
Terminals/peripherals compatibility not what vendor promised	6	0	0	0	0	0	0	13	2	13	0	0
Vendor enhancements/changes to hardware/software hard to keep up with	13	23	7	0	13	13	11	0	14	13	9	10
Equipment excessively noisy	13	0	0	0	9	0	44	0	10	0	9	5
Power/Cooling requirements excessive	0	8	0	0	4	0	0	0	2	0	5	5
Other	25	8	7	6	13	27	0	25	11	25	9	5
Significant Advantages (%)												
Users happy with response time	44	69	73	53	38	20	33	50	36	25	32	45
System easy to expand/reconfigure	63	92	100	47	46	28	44	50	50	63	46	60
System costs less than expected	6	8	7	12	17	7	0	13	7	0	9	5
Programs/data compatible, as vendor promised	31	39	60	24	13	13	0	13	16	0	14	20
Terminals/peripherals compatible, as vendor promised	19	8	53	18	9	13	22	13	21	13	23	25
System is power/energy efficient	19	46	33	24	9	27	0	13	22	0	5	5
Productivity aids help us keep programming costs down	13	39	40	29	4	7	11	13	18	13	23	25
Database language effective	0	8	13	18	17	0	11	13	12	13	23	10
Delivery and/or installation of equipment was ahead of schedule	0	8	20	24	0	0	11	0	7	13	0	5
Delivery and/or installation of software was ahead of schedule	0	0	7	24	4	0	11	0	1	0	5	10
Other	0	0	0	0	13	7	11	0	4	13	5	0
System Ratings (0-5.0):												
Ease of operation	3.1	3.5	3.3	3.4	3.4	3.4	2.9	3.1	3.3	3.4	3.2	3.4
Reliability of Mainframe	2.9	3.3	3.4	3.8	3.4	3.3	3.4	3.5	3.5	3.5	3.2	3.5
Reliability of Peripherals	2.5	3.2	3.1	3.5	2.8	3.1	2.8	3.3	3.1	3.0	3.0	3.0
Maintenance service:												
Responsiveness	2.8	3.2	3.1	3.1	2.9	2.7	3.0	3.0	2.8	3.0	2.9	2.8
Effectiveness	2.3	2.8	2.8	3.3	3.0	2.5	3.0	2.9	2.9	3.2	2.9	3.1
Technical support:												
Trouble-shooting	2.3	2.7	2.7	3.0	2.8	2.3	2.6	2.7	2.4	2.7	2.4	2.6
Education	2.3	2.5	2.9	2.8	2.5	2.2	2.9	2.4	2.5	3.0	2.0	2.5
Documentation	2.3	3.5	2.5	2.6	2.5	2.3	2.6	2.4	2.6	3.3	2.3	2.8
Manufacturer's software:												
Operating system	3.1	3.2	3.4	3.2	3.2	3.1	3.5	2.9	3.3	3.1	3.1	3.3
Compilers & Assemblers	3.0	3.3	3.3	3.3	3.1	3.0	3.0	2.9	3.1	3.0	2.4	3.1
Applications Programs	2.7	3.1	2.7	3.1	3.8	1.7	3.2	3.0	2.7	2.4	2.8	3.1
Ease of programming	3.2	3.2	3.5	3.0	2.9	3.3	2.8	2.7	3.3	3.3	3.1	3.3
Ease of conversion	3.4	3.1	3.4	2.6	2.5	3.0	2.0	2.7	2.7	3.0	2.8	3.1
Overall satisfaction	2.8	3.2	3.3	3.2	2.9	3.0	3.0	2.9	3.1	2.6	2.9	3.4
Would you recommend system to another user? (%)												
Yes	63	85	100	94	67	80	78	63	81	75	81	95
No	38	15	0	6	33	20	22	38	15	25	19	5

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. . . Score Machines for Satisfaction

Survey Item / Manufacturer and Model	Data General Eclipse S Series	Data General Eclipse M/600	Data General Eclipse (other models)	Data General Nova 3	Data General Nova 4	Data General Nova 800	Data General Nova 1200	Data General (other models)	Datapoint 1100	Datapoint 1500	Datapoint 1800	Datapoint 4000
No. of User Responses	24	8	4	33	10	5	9	8	7	10	5	13
No. of Systems Represented	36	12	19	43	10	6	12	9	24	10	5	20
Avg. Life of System (Mos.)	24.2	9.8	19.2	30.3	6.1	62.0	74.3	27.5	37.7	16.1	10.2	21.3
Acquisition Method (%)												
Purchase	83	75	75	78	70	100	100	88	57	70	0	62
Rental	0	0	0	6	0	0	0	0	14	0	0	8
Lease	17	25	25	15	30	0	0	12	29	30	100	31
Principal Applications (%)												
Accounting	42	75	50	69	40	20	0	63	57	60	20	54
Construction	0	0	0	12	10	20	0	13	0	10	0	8
Education	8	0	0	9	10	0	22	13	0	0	0	0
Government	4	13	0	0	0	20	0	0	0	0	0	15
Manufacturing	13	13	25	9	10	0	11	25	0	10	0	15
Payroll/Personnel	20	38	0	42	50	0	0	38	0	30	0	31
Service Bureaus	4	13	25	12	10	0	0	0	14	30	0	8
Transportation	0	0	0	6	0	0	0	0	0	0	0	0
Word Processing	8	25	25	3	30	0	0	38	29	0	20	23
Banking/Finance	4	0	0	12	0	0	0	0	0	10	0	8
Distributed Processing	0	25	50	6	0	0	0	0	29	30	20	23
Engineering/Scientific	33	13	0	6	10	80	55	25	0	10	20	8
Insurance	4	13	0	0	0	0	0	0	0	0	0	0
Medical/Health Care	8	25	25	15	0	0	0	0	0	0	0	8
Retail	8	0	25	9	0	0	0	0	0	10	0	23
Transaction Processing	8	38	0	27	30	0	11	0	0	0	20	15
Utilities-Power	0	0	25	0	0	0	0	14	0	0	0	0
Other	12	50	25	27	10	20	22	25	43	30	0	15
Source of Applications Prog. (%)												
In-house personnel	83	75	100	69	80	80	77	63	86	80	100	62
"Ready-made" programs from manufacturer	11	13	0	3	30	0	22	38	57	30	20	23
Contract Programming	20	50	25	42	40	20	22	13	29	0	20	46
Manufacturer's Personnel	8	0	0	3	60	0	0	0	0	0	0	8
Proprietary Software Packages	54	38	75	30	20	60	11	50	29	10	0	54
Other	4	0	0	0	0	0	0	0	0	10	0	8
Hardware Configuration												
No. of CPUs	40	12	19	43	11	6	12	9	24	10	5	24
No. of Workstations (avg.)	7.3	12.0	8.8	4.9	9.7	2.2	2.9	3.6	1.0	1.0	1.2	4.6
Software Configuration												
DBMS (%)	13	75	0	21	30	20	22	0	14	0	0	0
Datacomm monitors (%)	25	50	0	15	40	0	11	0	14	10	20	15
Primary Programming Language												
APL	8	0	0	0	0	0	44	0	14	0	0	0
BASIC	46	0	25	60	50	20	33	75	0	0	0	0
COBOL	4	75	50	21	0	0	0	0	0	0	0	8
FORTRAN	42	13	25	18	40	60	44	38	0	0	0	0
RPG	4	0	0	0	0	0	0	0	14	0	20	0
Other	29	50	25	15	20	20	11	25	71	100	0	92
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	17	38	50	18	10	0	0	25	14	10	0	46
Proprietary Software	33	50	100	21	40	40	22	50	29	10	0	31
Expanded Datacomm	17	50	50	33	40	20	11	0	29	30	40	39
Distributed Processing	0	0	25	15	0	0	11	0	29	30	0	23
Integrated Word Processing	13	13	25	18	60	0	0	13	29	20	20	46
Other	8	13	0	12	10	0	22	13	14	20	20	23
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	8	0	0	12	10	0	11	13	43	20	0	23
Yes, different manufacturer	8	0	50	12	0	0	11	13	29	30	20	0
No	71	100	50	75	80	100	77	75	29	50	80	77

Survey Item / Manufacturer and Model	Data General Eclipse S Series	Data General Eclipse M/600	Data General Eclipse (other models)	Data General Nova 3	Data General Nova 4	Data General Nova 800	Data General Nova 1200	Data General (other models)	Datapoint 1100	Datapoint 1500	Datapoint 1800	Datapoint 4000
Significant Problems (%)												
System proposed by vendor was too small	33	25	50	21	10	40	22	0	29	20	0	15
Delivery and/or installation of equipment was late	38	0	25	9	70	40	33	13	43	20	40	8
Delivery of required software was late	25	0	25	15	40	40	22	25	14	0	40	15
System costs exceeded expected total	13	0	50	12	0	0	11	0	29	10	0	0
Vendor did not provide all promised software or support	17	25	75	27	20	0	22	25	14	10	40	8
Program/data compatibility not what vendor promised	8	13	0	12	6	60	11	0	14	10	20	0
Terminals/peripherals compatibility not what vendor promised	4	0	25	6	10	0	11	0	0	0	0	0
Vendor enhancements/changes to hardware/software hard to keep up with	20	13	25	12	0	0	11	0	0	10	0	8
Equipment excessively noisy	0	0	0	6	10	20	11	13	14	10	0	0
Power/Cooling requirements excessive	0	0	0	3	10	0	0	0	0	10	0	0
Other	25	13	0	24	0	0	22	13	43	20	0	23
Significant Advantages (%)												
Users happy with response time	46	13	25	39	70	20	22	63	43	30	20	46
System easy to expand/reconfigure	58	88	50	42	60	40	44	75	43	40	40	92
System costs less than expected	4	0	0	6	0	0	11	13	14	30	20	15
Programs/data compatible, as vendor promised	13	38	25	18	30	40	11	25	29	10	40	8
Terminals/peripherals comaptible, as vendor promised	25	13	0	21	30	20	22	13	0	10	0	0
System is power/energy efficient	13	25	50	18	20	0	0	0	57	0	0	39
Productivity aids help us keep programming costs down	25	50	25	12	30	0	0	13	29	20	20	15
Database language effective	4	50	0	18	0	20	0	25	14	10	0	8
Delivery and/or installation of equipment was ahead of schedule	4	13	25	9	0	0	0	0	0	0	20	8
Delivery and/or installation of software was ahead of schedule	13	0	0	3	0	0	0	13	0	10	0	15
Other	13	13	0	6	0	0	11	0	43	10	0	8
System Ratings (4.0-0.0)												
Ease of operation	3.2	3.4	3.7	3.2	3.3	3.2	3.0	3.6	3.3	3.5	3.6	3.5
Reliability of Mainframe	3.6	3.4	3.5	3.4	3.3	2.8	3.3	3.8	3.1	3.4	3.4	3.7
Reliability of Peripherals	3.1	3.0	3.0	2.9	3.0	2.8	2.6	3.4	2.4	2.4	3.0	3.4
Maintenance service:												
Responsiveness	2.8	2.6	2.8	2.7	3.0	2.2	1.8	2.6	2.9	3.0	3.0	3.4
Effectiveness	2.9	2.9	2.5	2.8	2.7	3.2	2.2	2.7	2.4	2.6	2.6	3.2
Technical support:												
Trouble-shooting	2.6	2.4	2.0	2.6	2.6	2.8	2.0	2.7	2.4	2.1	2.4	2.8
Education	2.4	2.8	2.3	2.4	2.6	2.0	1.8	2.7	2.2	1.9	2.4	2.8
Documentation	2.5	2.3	2.3	2.2	2.2	2.2	2.0	2.9	2.1	2.4	2.0	2.8
Manufacturer's software:												
Operating system	3.3	3.5	2.3	2.9	3.4	2.8	2.8	3.3	3.4	3.1	3.4	3.4
Compilers & Assemblers	2.9	3.3	2.5	2.8	3.1	3.0	2.8	3.5	3.1	3.1	3.6	3.6
Applications Programs	2.8	3.0	2.3	2.6	1.9	2.8	2.5	2.5	2.5	2.8	1.0	3.3
Ease of programming	2.9	3.3	3.3	2.9	2.9	3.0	3.0	3.1	2.6	3.0	3.6	3.5
Ease of conversion	2.5	2.7	3.0	2.5	3.0	2.8	3.0	3.1	2.0	3.0	3.0	3.0
Overall satisfaction	2.9	3.1	2.8	2.8	3.0	2.8	2.9	3.1	2.7	2.9	3.2	3.3
Would you recommend system to another user? (%)												
Yes	75	88	75	60	80	40	50	100	100	90	60	92
No	25	12	25	38	20	60	50	0	0	10	40	8

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Minis and Small Business Computers . . .

Survey Item / Manufacturer and Model	DEC PDP-11/50 & 11/55	DEC PDP-11/60	DEC PDP-11/70	PDP-11 (unspecified)	DEC VAX-11/780	DEC (other models)	Digital Scientific Corp.	Educational Data Systems Point 4	Four-Phase IV/40	Four-Phase IV/70	Four-Phase IV/90	Four-Phase (other models)
No. of User Responses	7	13	136	6	17	10	5	6	6	10	16	4
No. of Systems Represented	9	13	373	17	18	16	5	6	6	29	80	4
Avg. Life of System (Mos.)	35.6	16.9	26.4	47.5	12.6	22.2	44.8	6.7	39.3	40.8	27.0	15.0
Acquisition Method (%)												
Purchase	86	100	82	100	82	100	80	100	0	40	7	0
Rental	0	0	1	0	0	0	0	0	17	30	7	75
Lease	14	0	16	0	18	0	20	0	83	40	67	25
Principal Applications (%)												
Accounting	29	15	38	17	24	20	60	67	67	40	43	25
Construction	0	0	2	6	6	0	0	0	0	0	0	0
Education	43	15	15	17	24	0	60	0	17	0	0	0
Government	0	8	6	0	12	0	0	0	0	0	29	0
Manufacturing	14	15	18	17	0	0	40	17	0	20	21	25
Payroll/Personnel	14	8	22	17	12	0	60	33	33	40	21	0
Service Bureaus	0	0	13	0	12	0	20	17	17	10	0	25
Transportation	0	0	5	0	6	0	0	0	0	10	0	0
Word Processing	14	8	19	0	18	40	20	50	0	0	14	25
Banking/Finance	0	15	11	0	12	0	0	0	0	0	0	0
Distributed Processing	0	15	11	50	18	0	20	0	0	40	21	0
Engineering/Scientific	0	46	20	50	88	30	20	0	0	0	0	0
Insurance	0	0	4	0	0	0	0	17	0	10	7	0
Medical/Health Care	0	8	5	17	0	20	0	0	67	10	29	25
Retail	0	0	4	0	0	0	0	17	0	0	0	0
Transaction Processing	0	8	13	17	0	0	0	0	17	10	29	25
Utilities-Power	14	0	1	0	6	0	0	0	0	0	0	0
Other	0	8	22	17	29	10	20	17	0	20	21	25
Source of Applications Prog. (%)												
In-house personnel	86	77	74	67	100	40	100	83	50	50	64	50
"Ready-made" programs from manufacturer	29	31	21	33	35	50	20	0	33	40	14	25
Contract Programming	14	8	29	0	6	10	0	33	0	10	14	50
Manufacturer's Personnel	0	0	52	0	0	0	0	0	0	0	0	25
Proprietary Software Packages	29	23	51	33	35	20	20	33	67	20	29	25
Other	0	0	3	17	12	0	20	0	0	0	0	0
Hardware Configuration												
No. of CPUs	9	100	383	17	18	13	5	6	6	29	80	4
No. of Workstations (avg.)	14.6	8.4	8.5	1.5	17.0	2.7	4.8	6.0	3.7	6.0	3.9	2.3
Software Configuration												
DBMS (%)	29	23	34	33	35	10	0	0	0	10	0	50
Datacomm monitors (%)	29	8	19	0	12	10	20	0	17	20	0	50
Primary Programming Language												
APL	0	0	1	0	0	0	0	0	0	10	0	0
BASIC	57	39	42	17	18	0	0	100	0	0	0	0
COBOL	29	15	15	17	18	0	0	0	50	20	7	50
FORTRAN	43	46	27	33	88	20	80	0	0	0	0	0
RPG	0	0	2	0	0	0	0	0	0	0	0	0
Other	43	23	31	83	41	70	60	0	50	30	57	75
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	0	15	24	33	47	40	0	0	17	20	21	75
Proprietary Software	0	23	39	33	35	20	60	50	33	0	21	25
Expanded Datacomm	14	39	40	50	59	10	80	17	0	10	21	25
Distributed Processing	14	15	10	33	18	0	0	0	17	0	29	25
Integrated Word Processing	0	8	13	17	24	10	0	50	33	10	29	50
Other	0	15	9	17	0	30	0	17	17	10	7	0
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	14	17	9	0	6	10	20	0	33	20	0	25
Yes, different manufacturer	0	0	2	17	0	0	20	0	50	10	14	0
No	86	83	92	83	88	90	40	83	17	70	86	75

Survey Item / Manufacturer and Model	DEC PDP-11/50 & 11/55	DEC PDP-11/60	DEC PDP-11/70	PDP-11 (unspecified)	DEC VAX-11/780	DEC (other models)	Digital Scientific Corp.	Educational Data Systems Point 4	Four-Phase IV/40	Four-Phase IV/70	Four-Phase IV/90	Four-Phase (other models)
Significant Problems (%)												
System proposed by vendor was too small	14	23	15	0	18	0	0	0	0	0	38	0
Delivery and/or installation of equipment was late	43	15	24	33	24	20	20	0	0	10	38	50
Delivery of required software was late	0	15	21	17	18	10	0	0	0	10	29	25
System costs exceeded expected total	0	8	11	17	6	0	0	0	17	0	29	25
Vendor did not provide all promised software or support	14	8	13	33	6	0	20	0	33	0	38	50
Programs/data compatibility not what vendor promised	14	0	6	0	12	0	0	0	0	0	0	25
Terminals/peripherals compatibility not what vendor promised	0	0	6	17	6	0	0	0	0	0	7	0
Vendor enhancements/changes to hardware/software hard to keep up with	0	23	9	17	0	0	40	17	33	10	0	0
Equipment excessively noisy	14	15	4	0	18	0	20	0	0	0	0	0
Power/Cooling requirements excessive	14	0	4	17	0	0	0	0	0	0	7	0
Other	0	15	12	0	0	20	20	0	0	20	14	25
Significant Advantages (%)												
Users happy with response time	14	39	57	17	88	60	40	100	17	40	57	50
System easy to expand/reconfigure	57	54	68	50	94	50	40	100	33	20	50	50
System costs less than expected	0	8	4	0	0	20	20	0	0	0	7	0
Programs/data compatible, as vendor promised	29	39	15	17	59	20	40	50	0	20	7	25
Terminals/peripherals comaptible, as vendor promised	57	54	21	50	53	20	40	50	0	10	0	0
System is power/energy efficient	14	0	13	33	6	10	0	17	0	0	21	25
Productivity aids help us keep programming costs down	14	23	32	0	71	10	0	33	17	10	14	75
Database language effective	14	15	18	33	6	10	0	17	0	20	14	0
Delivery and/or installation of equipment was ahead of schedule	0	8	7	0	24	0	20	33	17	0	14	0
Delivery and/or installation of software was ahead of schedule	0	0	1	0	0	20	20	17	0	0	7	0
Other	0	8	2	0	0	30	0	0	17	0	7	25
System Ratings (4.0-0.0)												
Ease of operation	3.4	3.3	3.4	3.2	3.6	3.8	3.0	4.0	2.8	3.6	3.1	3.3
Reliability of Mainframe	3.4	3.5	3.5	3.2	3.7	3.8	3.0	3.8	3.5	3.5	3.0	3.8
Reliability of Peripherals	3.3	2.8	3.0	2.8	3.1	3.6	2.6	3.7	3.0	3.2	2.8	3.8
Maintenance service:												
Responsiveness	2.6	3.2	2.9	2.0	3.1	3.3	3.2	3.5	3.3	3.0	2.8	3.3
Effectiveness	2.3	3.3	3.7	2.3	2.9	3.4	2.6	3.3	3.0	2.6	2.8	3.5
Technical support:												
Trouble-shooting	2.5	3.2	2.6	2.0	2.7	3.3	2.5	3.5	2.3	2.7	2.2	3.3
Education	2.8	3.0	2.6	2.5	2.6	3.2	2.0	3.3	2.0	2.3	2.4	2.7
Documentation	2.7	2.9	2.5	2.4	2.9	3.0	2.0	2.7	3.0	2.3	2.4	2.7
Manufacturer's Software												
Operating system	3.1	3.1	3.3	2.8	3.4	3.3	2.3	3.6	3.0	3.2	2.9	3.3
Compilers & Assemblers	3.3	2.9	3.2	2.6	3.4	3.5	3.0	3.6	3.0	3.1	2.8	3.3
Applications Programs	3.0	2.8	2.8	2.7	3.0	3.5	3.5	3.7	2.8	2.8	2.8	3.8
Ease of programming	3.3	3.2	3.2	2.3	3.5	3.4	3.2	4.0	3.0	3.2	2.4	3.3
Ease of conversion	2.9	3.3	2.8	2.8	3.3	3.3	3.4	4.0	3.0	2.8	2.1	3.0
Overall satisfaction	3.1	3.2	3.1	3.0	3.4	3.7	2.8	4.0	2.7	3.1	2.6	3.3
Would you recommend vendor to previous user? (%)												
Yes	100	92	91	67	88	80	80	100	67	90	71	100
No	0	8	9	17	6	10	20	0	33	10	29	0

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. . . Rated by Users on Four-Point Scale

Survey Item / Manufacturer and Model	General Automation SPC-16/65	General Automation 16/440 & 16/460	General Automation 18/30	Harris (all models)	Hewlett-Packard 1000 Series	Hewlett-Packard 2000	Hewlett-Packard 3000 Series II	Hewlett-Packard 3000 Series III	Hewlett-Packard 3000 Series 33	Hewlett-Packard 3000 (unspecified)	Hewlett-Packard (other models)	Honeywell Level 6
No. of User Responses	4	5	8	8	17	8	31	58	10	24	4	29
No. of Systems Represented	4	9	9	8	24	16	36	65	11	36	4	37
Avg. Life of System (Mos.)	62.0	29.0	72.0	29.0	30.0	66.4	25.9	15.9	6.1	23.1	10.0	12.4
Acquisition Method (%)												
Purchase	75	100	88	63	88	88	80	82	50	54	100	79
Rental	0	0	0	0	0	0	7	2	0	8	0	3
Lease	25	0	12	37	12	13	13	15	50	38	0	17
Principal Applications (%)												
Accounting	50	0	88	37	6	25	65	75	60	50	75	59
Construction	0	0	25	0	6	0	7	4	0	0	0	7
Education	0	0	13	37	6	75	23	11	10	1	0	7
Government	0	0	0	25	0	0	16	2	10	1	0	0
Manufacturing	0	60	25	0	35	0	23	24	20	33	0	31
Payroll/Personnel	25	0	88	37	12	0	42	49	40	38	25	36
Service Bureaus	0	0	0	0	18	0	10	22	10	8	50	3
Transportation	0	0	13	0	0	0	0	4	0	0	25	3
Word Processing	25	0	0	13	6	13	7	22	10	13	50	3
Banking/Finance	0	0	0	13	0	0	3	16	10	8	25	0
Distributed Processing	0	20	0	25	24	13	7	22	10	13	0	21
Engineering/Scientific	50	40	50	13	41	13	0	11	20	21	25	0
Insurance	0	0	0	0	0	0	7	7	0	8	0	0
Medical/Health Care	0	0	0	0	0	0	7	4	0	13	0	11
Retail	0	0	13	0	0	0	13	11	0	0	0	7
Transaction Processing	0	40	0	13	24	0	23	27	10	21	50	14
Utilities-Power	0	0	0	13	6	0	0	2	0	0	0	7
Other	0	20	25	13	0	13	3	4	30	8	0	31
Source of Applications Prog. (%)												
In-house personnel	100	100	100	100	82	50	87	88	100	88	100	66
"Ready-made" programs from manufacturer	25	40	13	25	18	88	19	26	10	21	50	17
Contract Programming	50	0	25	0	29	13	45	24	10	42	25	24
Manufacturer's Personnel	0	0	13	0	0	0	3	0	0	4	0	21
Proprietary Software Packages	50	20	25	37	35	50	29	47	60	38	50	21
Other	0	0	0	0	0	13	7	0	10	0	0	3
Hardware Configuration												
No. of CPUs	4	9	9	8	32	16	36	65	11	36	4	37
No. of Workstations (avg.)	2.0	5.0	0.5	7.3	6.0	11.0	14.0	16.0	7.0	21.0	6.0	10.0
Software Configuration												
DBMS (%)	25	40	0	50	0	13	84	47	90	92	75	21
Datacomm monitors (%)	0	20	25	25	0	25	19	31	10	92	0	14
Primary Programming Language												
APL	0	0	0	0	0	0	3	2	0	4	0	0
BASIC	0	0	13	37	18	88	29	13	30	38	100	10
COBOL	0	20	0	75	6	0	81	76	70	67	25	76
FORTRAN	100	80	50	37	82	13	19	27	20	42	25	7
RPG	0	0	13	13	0	0	26	31	30	21	25	3
Other	0	40	0	13	0	25	16	20	10	21	25	10
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	0	0	0	13	41	25	19	26	40	25	75	0
Proprietary Software	25	0	0	25	21	13	23	44	60	33	50	28
Expanded Datacomm	0	20	25	25	29	50	39	40	20	25	0	17
Distributed Processing	0	0	25	0	14	38	10	24	20	21	0	38
Integrated Word Processing	0	0	13	0	7	13	16	24	10	4	25	7
Other	0	0	0	0	0	0	19	0	10	4	25	10
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	25	0	0	0	0	13	16	0	0	0	0	10
Yes, different manufacturer	25	40	50	13	0	13	0	0	0	8	0	3
No	25	60	50	87	100	50	81	96	100	92	75	3

Manufacturer and Model / Survey Item	General Automation SPC-16/65	General Automation 16/440 & 16/460	General Automation 18/30	Harris (all models)	Hewlett-Packard 1000 Series	Hewlett-Packard 2000	Hewlett-Packard 3000 Series II	Hewlett-Packard 3000 Series III	Hewlett-Packard 3000 Series 33	Hewlett-Packard 3000 (unspecified)	Hewlett-Packard (other models)	Honeywell Level 6
Significant Problems (%)												
System proposed by vendor was too small	25	20	0	13	18	13	10	15	0	17	0	83
Delivery and/or installation of equipment was late	25	40	13	25	12	13	3	6	30	4	0	14
Delivery of required software was late	50	60	0	0	6	13	10	2	10	0	50	48
System costs exceeded expected total	0	20	0	0	18	0	7	7	0	8	0	28
Vendor did not provide all promised software or support	50	80	13	25	0	25	10	7	0	0	25	35
Program/data compatibility not what vendor promised	0	20	0	0	0	0	0	2	0	0	0	17
Terminals/peripherals compatibility not what vendor promised	0	0	0	0	12	13	0	2	10	4	0	7
Vendor enhancements/changes to hardware software hard to keep up with	0	20	13	13	18	75	3	2	0	4	0	17
Equipment excessively noisy	0	0	13	13	0	0	0	0	0	0	0	0
Power/Cooling requirements excessive	0	20	13	0	6	0	3	6	10	8	0	3
Other	0	40	25	13	23	25	19	4	10	8	25	7
Significant Advantages (%)												
Users happy with response time	25	0	25	75	41	50	46	55	50	63	75	52
System easy to expand/reconfigure	50	20	0	37	41	38	81	82	60	79	75	68
System costs less than expected	0	0	13	13	0	0	7	9	10	8	50	3
Programs/data compatible, as vendor promised	25	20	75	50	6	13	36	51	50	33	0	17
Terminals/peripherals comaptible, as vendor promised	25	20	13	25	12	25	16	18	20	17	0	17
System is power/energy efficient	0	0	0	0	12	13	26	40	20	33	50	24
Productivity aids help us keep programming costs down	25	0	0	25	6	13	39	58	20	46	75	35
Database language effective	0	0	0	25	23	13	58	71	60	75	75	10
Delivery and/or installation of equipment was ahead of schedule	0	20	0	0	18	0	16	30	10	25	25	7
Delivery and/or installation of software was ahead of schedule	0	0	13	0	6	0	13	15	0	13	0	0
Other	0	0	0	0	12	0	7	2	0	0	0	10
System Ratings (4.0-0.0)												
Ease of operation	3.0	2.2	3.1	3.3	3.1	3.6	3.7	3.8	3.7	3.6	4.0	3.0
Reliability of Mainframe	3.0	2.6	2.9	3.0	3.5	3.6	3.7	3.8	3.3	3.7	3.8	3.1
Reliability of Peripherals	3.0	2.2	2.9	3.0	3.2	3.3	3.4	3.4	3.3	3.3	3.5	3.0
Maintenance service:												
Responsiveness	3.3	2.8	2.8	3.3	2.9	3.0	3.1	3.2	3.1	3.1	3.3	2.9
Effectiveness	3.3	2.8	2.8	2.8	2.9	2.6	3.1	3.2	2.9	3.3	3.3	2.8
Technical support:												
Trouble-shooting	2.0	1.6	1.7	2.5	2.5	2.7	2.8	3.1	3.0	2.9	3.3	2.5
Education	1.5	1.4	2.0	2.4	2.6	2.9	2.8	3.1	3.2	3.0	3.0	2.1
Documentation	1.5	1.4	2.0	1.9	2.5	2.6	2.9	3.2	3.1	2.8	2.6	2.2
Manufacturer's software:												
Operating system	2.5	2.0	2.9	2.9	3.1	2.9	3.4	3.7	3.8	3.6	3.8	2.9
Compilers & Assemblers	3.0	2.0	3.0	2.9	2.7	2.7	3.2	3.4	2.9	3.4	3.5	3.0
Applications Programs	2.5	2.0	3.0	2.3	2.6	3.0	2.8	3.0	2.8	3.1	3.0	2.6
Ease of programming	2.5	1.8	3.3	3.1	2.7	2.7	3.5	3.5	3.2	3.4	3.8	3.0
Ease of conversion	2.5	2.0	3.1	2.9	2.6	2.8	3.4	3.3	3.4	2.7	3.0	2.6
Overall satisfaction	2.3	1.6	2.9	3.1	3.0	3.2	3.4	3.6	3.5	3.5	3.8	2.8
Would you recommend system to another user? (%)												
Yes	50	20	50	75	65	57	90	98	100	96	100	76
No	50	80	38	13	18	43	10	2	0	4	0	24

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Users Rate Their Small Machines . . .

Survey Item / Manufacturer and Model	Honeywell Level 62	IBM Series 1	IBM S/3 Model 6	IBM S/3 Model 8	IBM S/3 Model 10	IBM S/3 Model 12	IBM S/3 Model 15	IBM S/3 Model 15B	IBM S/3 Model 15C	IBM S/3 Model 15D	IBM S/3 Unspecified	IBM S/7
No. of User Responses	46	46	4	18	86	72	28	13	4	138	13	11
No. of Systems Represented	46	119	4	19	101	72	29	14	4	141	13	12
Avg. Life of System (Mos.)	27.8	12.0	95.0	47.0	83.6	38.8	44.9	36.9	51.5	36.0	73.0	62.2
Acquisition Method (%)												
Purchase	17	91	50	67	77	50	54	38	50	43	46	82
Rental	24	0	25	5	17	26	14	8	25	17	15	28
Lease	37	8	25	28	6	44	29	54	25	40	38	27
Principal Applications (%)												
Accounting	80	36	50	89	86	88	79	77	75	90	85	0
Construction	7	8	0	11	8	4	11	0	0	5	8	0
Education	4	4	25	5	6	4	7	0	0	2	0	27
Government	0	2	0	0	10	0	3	8	0	5	0	0
Manufacturing	33	20	25	44	28	44	25	15	50	48	38	0
Payroll/Personnel	50	16	75	89	71	76	75	53	75	70	69	0
Service Bureaus	11	8	0	11	10	6	18	15	0	7	8	0
Transportation	0	2	0	11	6	10	3	0	0	8	8	0
Word Processing	0	16	0	0	0	1	3	0	0	1	0	0
Banking/Finance	7	2	0	5	10	4	18	15	25	8	8	18
Distributed Processing	7	24	0	0	0	6	0	0	0	8	0	0
Engineering/Scientific	2	4	25	0	0	0	0	0	0	6	0	27
Insurance	9	2	0	5	5	1	7	23	0	3	0	0
Medical/Health Care	4	11	0	0	1	6	7	0	0	6	8	0
Retail	11	4	0	5	7	10	7	8	0	11	8	0
Transaction Processing	17	6	0	17	15	15	11	0	0	21	15	21
Utilities-Power	2	0	0	0	2	7	0	0	0	4	0	21
Other	0	27	25	5	2	14	11	8	0	10	23	36
Source of Applications Prog. (%)												
In-house personnel	85	62	100	89	98	99	96	87	75	100	85	73
"Ready-made" programs from manufacturer	24	18	25	28	23	25	14	31	50	37	38	36
Contract Programming	22	31	25	11	22	31	14	38	25	32	54	36
Manufacturer's Personnel	15	0	0	17	3	6	0	0	25	6	8	0
Proprietary Software Packages	23	27	0	11	10	14	18	23	50	36	31	0
Other	0	2	0	0	0	0	3	0	0	1	0	0
Hardware Configuration												
No. of CPUs	46	119	4	19	101	72	0	0	4	141	13	14
No. of Workstations (avg.)	6.1	1.7	0	0.3	0.3	1.6	4.4	3.9	2.0	11.3	1.8	3.8
Software Configuration												
DBMS (%)	4	22	0	0	0	0	0	0	0	0	0	0
Datacomm monitors (%)	48	18	0	0	0	0	0	0	0	0	0	0
Primary Programming Language												
APL	0	0	0	0	0	0	0	0	0	0	0	9
BASIC	0	0	25	0	0	0	0	0	0	0	0	0
COBOL	87	20	0	0	7	11	11	8	0	21	15	0
FORTRAN	7	4	0	0	1	0	0	0	0	2	85	0
RPG	43	0	100	89	86	89	74	100	100	86	0	0
Other	0	80	0	0	0	0	0	0	0	1	0	64
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	24	27	25	5	4	15	0	8	0	21	0	0
Proprietary Software	30	29	0	0	3	8	3	8	0	21	8	0
Expanded Datacomm	43	24	25	11	16	22	21	8	25	41	8	0
Distributed Processing	9	4	50	5	10	7	18	54	0	11	8	0
Integrated Word Processing	4	16	0	0	1	2	3	23	25	9	0	0
Other	0	8	25	11	4	0	7	8	25	9	0	0
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	0	4	50	28	40	43	14	31	25	22	38	18
Yes, different manufacturer	13	8	25	17	7	11	11	15	0	2	8	18
No	78	82	25	50	53	46	71	38	75	76	46	45

Survey Item / Manufacturer and Model	Honeywell Level 62	IBM Series 1	IBM S/3 Model 6	IBM S/3 Model 8	IBM S/3 Model 10	IBM S/3 Model 12	IBM S/3 Model 15	IBM S/3 Model 15B	IBM S/3 Model 15C	IBM S/3 Model 15D	IBM S/3 Unspecified	IBM S/7
Significant Problems (%)												
System proposed by vendor was too small	24	13	75	0	10	10	3	0	25	12	0	9
Delivery and/or installation of equipment was late	11	24	0	11	1	4	7	0	25	11	0	0
Delivery of required software was late	15	16	0	6	2	3	0	0	50	4	0	9
System costs exceeded expected total	13	11	25	0	3	1	7	0	0	2	0	9
Vendor did not provide all promised software or support	28	16	0	0	2	4	3	0	25	8	8	18
Program/data compatibility not what vendor promised	0	13	0	0	2	1	0	0	0	2	0	0
Terminals/peripherals compatibility not what vendor promised	2	4	0	5	0	5	0	8	0	1	0	0
Vendor enhancements/changes to hardware/software hard to keep up with	17	8	0	5	2	8	7	0	25	6	0	36
Equipment excessively noisy	7	4	0	5	10	0	11	8	25	8	0	9
Power/Cooling requirements excessive	11	2	0	0	8	3	3	0	25	4	0	0
Other	9	2	25	22	0	11	11	15	50	12	23	27
Significant Advantages (%)												
Users happy with response time	37	51	0	22	22	19	36	38	25	61	15	18
System easy to expand/reconfigure	67	58	25	28	21	18	46	38	25	41	23	0
System costs less than expected	11	9	0	11	12	5	0	0	0	4	0	0
Programs/data compatible, as vendor promised	36	7	0	22	19	38	25	31	25	33	8	0
Terminals/peripherals compatible, as vendor promised	4	9	0	0	3	28	7	15	50	17	0	0
System is power/energy efficient	17	24	25	5	6	13	14	0	25	7	8	9
Productivity aids help us keep programming costs down	17	18	25	5	13	11	18	8	25	43	0	0
Database language effective	4	13	0	5	3	6	0	0	0	3	0	0
Delivery and/or installation of equipment was ahead of schedule	9	2	0	11	9	14	3	0	25	9	0	0
Delivery and/or installation of software was ahead of schedule	9	2	0	0	3	6	3	0	25	4	0	0
Other	2	7	0	11	0	28	18	0	25	3	0	9
System Ratings (1.0-4.0)												
Ease of operation	3.2	3.2	3.3	3.3	3.2	3.2	3.3	3.5	3.3	3.3	3.8	2.5
Reliability of Mainframe	3.0	3.5	3.5	3.7	3.6	3.7	3.8	3.8	3.5	3.7	3.0	3.4
Reliability of Peripherals	2.9	3.3	3.3	3.4	3.3	3.3	3.3	3.2	3.3	3.5	3.3	2.8
Maintenance service:												
Responsiveness	3.1	3.1	2.8	3.2	3.2	3.2	3.3	3.0	3.0	3.3	2.8	2.7
Effectiveness	2.8	3.2	3.3	3.0	3.2	3.3	3.3	3.1	3.0	3.3	3.0	2.7
Technical support:												
Trouble-shooting	2.7	2.8	2.3	2.8	3.0	3.0	2.9	3.2	2.8	2.9	2.6	2.4
Education	2.5	2.5	2.8	2.9	3.0	3.1	2.9	3.3	2.8	3.0	3.1	2.0
Documentation	2.2	2.4	2.3	2.9	3.0	2.9	3.0	3.0	2.5	2.9	2.8	1.9
Manufacturer's software:												
Operating system	3.2	2.6	3.5	3.3	3.2	3.2	3.3	3.3	2.8	3.2	3.2	2.8
Compilers & Assemblers	3.2	2.7	3.3	3.4	3.2	3.2	3.3	3.3	3.0	3.4	3.5	2.1
Applications Programs	2.8	2.7	2.8	3.0	3.0	2.9	3.0	2.9	2.5	2.9	3.0	2.9
Ease of programming	3.0	2.5	2.8	3.4	3.2	3.2	3.6	2.9	3.0	3.1	3.3	1.7
Ease of conversion	2.7	2.5	3.0	3.1	2.8	3.0	3.0	3.1	2.8	2.8	3.0	2.0
Overall satisfaction	2.9	3.0	2.5	3.3	3.2	3.2	3.3	3.1	3.0	3.2	3.1	2.6
Would you recommend system to another user? (%)												
Yes	74	84	50	67	81	72	82	100	75	87	62	36
No	24	16	50	33	19	28	14	0	25	13	38	64

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. . . Ranging From AM Jacquard to Wang

Survey Item / Manufacturer and Model	IBM S/32	IBM S/34	IBM S/360 Model 20	IBM 1130	IBM 8100	Lockheed System III	Microdata Reyala & Reality Series 4000	Microdata Reyala & Series 6000	Microdata (other models)	Minicomputer Systems MICOS 200	MODCOMP II	MODCOMP Classic Series
No. of User Responses	48	296	10	11	5	5	25	16	4	5	4	5
No. of Systems Represented	48	347	11	20	6	5	33	16	5	5	6	13
Avg. Life of System (Mos.)	32.8	13.8	105.4	110.0	5.4	53.0	28.8	20.5	33.0	27.2	35.8	2.2
Acquisition Method (%)												
Purchase	35	23	80	82	0	60	80	94	100	80	100	80
Rental	15	23	0	9	60	0	0	0	0	0	0	0
Lease	50	46	20	9	20	40	20	6	0	20	0	20
Principal Applications (%)												
Accounting	81	82	80	64	20	60	76	63	100	100	0	40
Construction	8	6	20	9	0	40	0	6	0	0	25	0
Education	6	4	20	9	0	0	12	25	0	0	0	0
Government	0	7	20	18	20	20	8	13	0	20	25	0
Manufacturing	25	41	0	27	20	0	28	31	50	20	0	0
Payroll/Personnel	52	57	80	55	20	40	48	50	75	40	0	20
Service Bureaus	6	9	30	9	0	20	12	19	50	20	25	20
Transportation	6	3	10	0	0	0	0	13	25	0	25	0
Word Processing	4	4	0	0	20	0	12	6	25	20	0	0
Banking/Finance	2	3	0	0	20	0	4	6	0	0	0	0
Distributed Processing	6	10	0	0	60	0	4	19	25	20	0	20
Engineering/Scientific	4	5	10	27	0	0	4	0	0	0	50	40
Insurance	2	5	0	0	0	40	4	0	0	0	0	20
Medical/Health Care	6	5	10	0	0	0	8	0	0	0	0	20
Retail	0	10	0	9	0	0	4	38	25	0	0	0
Transaction Processing	6	12	0	9	60	0	16	19	25	0	0	20
Utilities-Power	0	5	0	0	0	0	0	6	0	0	0	0
Other	21	0	0	9	0	0	40	6	50	20	0	0
Source of Applications Prog. (%)												
In-house personnel	65	83	100	91	100	80	64	69	75	40	100	100
"Ready-made" programs from manufacturer	42	42	10	18	20	0	8	6	0	20	25	0
Contract Programming	31	30	0	27	0	40	48	56	70	40	0	0
Manufacturer's Personnel	4	2	10	9	0	0	4	6	0	0	0	0
Proprietary Software Packages	6	15	0	27	0	60	32	50	25	40	0	20
Other	0	0	0	9	0	0	4	0	0	0	0	0
Hardware Configuration												
No. of CPUs	48	347	11	31	6	5	32	16	5	5	5	13
No. of Workstations (avg.)	1.0	5.0	0.4	0	1.5	1.0	7.9	12.0	7.8	4.2	2.8	2.5
Software Configuration												
DBMS (%)	0	0	0	0	0	0	40	50	50	20	25	40
Datacomm monitors (%)	0	0	0	0	0	0	12	13	0	20	25	60
Primary Programming Language												
APL	0	0	10	0	0	0	0	0	0	0	0	0
BASIC	0	3	0	0	0	0	80	100	100	100	0	0
COBOL	0	11	10	18	40	0	0	0	0	0	0	0
FORTRAN	2	3	10	64	0	0	0	0	0	0	75	100
RPG	60	41	0	27	0	80	4	6	0	0	0	0
Other	0	0	0	18	20	0	68	19	50	0	0	0
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	10	26	0	9	0	0	12	6	0	0	0	20
Proprietary Software	4	13	20	9	0	0	12	25	25	20	0	0
Expanded Datacomm	6	36	10	9	20	20	32	38	50	20	25	40
Distributed Processing	6	15	0	18	40	0	4	13	25	40	0	40
Integrated Word Processing	2	9	10	0	20	0	4	13	25	20	0	40
Other	12	0	0	18	0	0	12	0	0	40	0	0
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	35	4	30	18	20	0	4	6	0	0	25	20
Yes, different manufacturer	8	1	10	18	20	0	4	13	25	20	0	0
No	52	82	40	64	60	100	88	81	75	80	75	80

Survey Item / Manufacturer and Model	IBM S/32	IBM S/34	IBM S/360 Model 20	IBM 1130	IBM 8100	Lockheed System III	Microdata Reyala & Reality Series 4000	Microdata Reyala & Series 6000	Microdata (other models)	Minicomputer Systems MICOS 200	MODCOMP II	MODCOMP Classic Series
Significant Problems (%)												
System proposed by vendor was too small	17	17	10	9	20	0	20	31	25	20	0	0
Delivery and/or installation of equipment was late	0	11	10	0	20	0	0	19	0	0	25	0
Delivery of required software was late	0	2	0	0	20	0	4	25	25	0	25	0
System costs exceeded expected total	13	3	10	9	20	20	12	6	0	0	0	0
Vendor did not provide all promised software or support	13	5	10	0	0	0	12	38	50	20	0	0
Program/data compatibility not what vendor promised	4	3	10	0	0	0	0	6	0	0	25	0
Terminals/peripherals compatibility not what vendor promised	0	2	0	0	0	20	0	6	0	20	0	0
Vendor enhancements/changes to hardware software hard to keep up with	2	7	0	0	0	20	4	19	0	0	25	20
Equipment Excessively Noisy	2	2	30	9	0	0	0	0	0	0	0	0
Power/Ceiling requirements excessive	4	2	20	9	0	0	4	0	0	0	0	0
Other	12	5	10	9	40	0	8	31	0	0	0	20
Significant Advantages (%)												
Users happy with response time	35	62	10	9	40	0	68	50	50	20	25	60
System easy to expand/reconfigure	19	75	0	27	0	20	56	69	50	60	25	80
System costs less than expected	0	7	0	27	0	0	4	6	0	20	25	0
Programs/data compatible, as vendor promised	21	47	30	9	40	0	16	13	0	20	50	80
Terminals/peripherals comaptible, as vendor promised	4	4	0	0	60	0	4	13	0	40	50	40
System is power/energy efficient	19	26	0	9	0	0	40	25	50	0	0	60
Productivity aids help us keep programming costs down	23	52	10	9	20	20	52	50	25	20	0	40
Database language effective	10	6	0	0	20	0	88	94	75	20	0	60
Delivery and/or installation of equipment was ahead of schedule	10	13	10	0	0	0	16	13	50	20	0	40
Delivery and/or installation fo software was ahead of schedule	12	8	0	0	0	0	4	6	25	0	0	20
Other	2	2	0	9	0	0	4	6	0	20	0	0
System Ratings (4.0-0.0)												
Ease of operation	3.5	3.6	3.2	3.5	3.4	3.4	3.8	3.8	3.5	3.4	2.3	3.6
Reliability of Mainframe	3.8	3.6	3.4	3.6	3.3	2.8	3.6	3.4	3.5	3.0	3.8	3.6
Reliability of Peripherals	3.7	3.6	2.9	3.3	2.8	3.0	3.4	3.3	2.5	2.8	3.3	2.8
Maintenance service:												
Responsiveness	3.6	3.4	2.9	3.1	3.0	2.4	3.2	2.9	2.5	2.0	2.8	2.2
Effectiveness	3.7	3.4	2.9	3.2	3.0	2.8	3.2	2.9	2.5	2.4	2.8	2.2
Technical support:												
Trouble-shooting	3.3	3.0	2.7	3.0	3.0	1.8	2.9	2.4	3.3	2.4	3.3	2.2
Education	3.1	3.0	2.6	2.3	2.8	1.6	2.5	1.9	2.5	2.8	3.0	2.8
Documentation	3.2	3.1	2.6	2.2	2.8	1.6	2.5	2.0	2.5	2.8	2.5	3.0
Manufacturer's software:												
Operating system	3.5	3.5	3.0	3.3	3.2	2.8	3.7	3.4	3.3	3.6	3.3	3.4
Compilers & Assemblers	3.5	3.5	2.9	3.2	3.0	2.8	3.7	3.3	2.8	2.5	3.3	3.4
Applications Programs	2.9	3.0	2.7	3.0	3.0	2.8	3.2	2.9	2.8	3.3	2.5	3.5
Ease of programming	2.9	3.5	3.0	3.0	3.0	2.5	3.7	3.7	3.3	3.6	2.7	3.2
Ease of conversion	3.0	3.2	3.2	2.4	3.0	4.0	3.4	3.4	3.0	3.0	2.7	3.0
Overall satisfaction	3.4	3.5	2.9	3.2	3.0	2.6	3.7	3.2	3.3	3.0	2.8	3.4
Would you recommend system to another user? (%)												
Yes	83	98	50	27	100	60	92	81	75	80	75	100
No	17	2	50	64	0	40	8	19	25	20	25	0

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Mini, Small Business Computer Users . . .

Survey Item / Manufacturer and Model	MODCOMP (other models)	NCR 399	NCR Century 50 thru 100	NCR 8200	NCR 8300	NCR (other SBC models)	Nixdorf 8870	Perkin-Elmer 6/16, 7/16 & 8/16	Perkin-Elmer 7/32 & 8/32	Philips P-350 Series	Pick & Associates Evolution	Prime Computer 300 & 350
No. of User Responses	3	10	13	40	4	6	5	5	6	2	3	7
No. of Systems Represented	13	10	13	75	4	7	5	9	38	4	7	14
Avg. Life of System (Mos.)	14.2	65.0	78.4	27.3	14.5	23.5	20.0	35.0	42.3	41.0	31.0	25.2
Acquisition Method (%)												
Purchase	100	70	69	50	50	83	60	100	100	100	100	71
Rental	0	20	8	20	50	0	40	0	0	0	0	0
Lease	0	10	23	30	0	17	0	0	0	0	0	29
Principal Applications (%)												
Accounting	33	60	100	75	25	50	40	60	33	50	100	0
Construction	0	10	0	5	0	0	0	0	0	0	0	14
Education	0	0	15	3	0	0	0	0	0	0	67	29
Government	67	0	0	3	0	17	0	0	0	0	0	0
Manufacturing	33	10	31	23	25	0	20	0	17	0	67	29
Payroll/Personnel	0	30	92	48	25	75	0	0	17	100	67	29
Service Bureaus	0	10	15	3	0	0	0	0	17	0	67	0
Transportation	0	0	0	0	0	0	0	0	0	0	0	0
Word Processing	0	0	8	0	0	0	0	20	0	0	67	0
Banking/Finance	0	30	8	5	50	17	0	0	0	0	33	14
Distributed Processing	0	10	0	3	0	0	20	0	17	0	0	0
Engineering/Scientific	33	0	0	0	0	0	0	0	33	0	0	14
Insurance	0	0	15	0	0	0	0	20	0	0	33	14
Medical/Health Care	0	0	8	13	0	17	0	0	0	0	0	0
Retail	0	0	23	3	0	17	0	0	17	0	67	0
Transaction Processing	0	0	8	10	0	34	20	20	17	0	0	0
Utilities-Power	0	0	0	5	0	17	0	0	0	50	0	0
Other	67	0	15	15	25	0	0	0	0	0	33	0
Source of Application Prog. (%)												
In-house personnel	100	60	100	43	25	33	60	80	83	0	100	86
"Ready-made" programs from manufacturer	33	30	69	63	50	33	100	0	17	0	33	14
Contract Programming	0	10	15	25	25	17	20	40	17	50	0	14
Manufacturer's Personnel	0	40	23	5	0	17	20	0	0	50	0	0
Proprietary Software Packages	33	0	8	23	50	33	40	0	50	0	33	29
Other	0	0	0	0	0	0	0	0	0	0	0	0
Hardware Configuration												
No. of CPUs	13	10	0	75	4	7	5	17	9	3	7	12
No. of Workstations (avg.)	1.3	0	0	2.3	8.2	0	4.4	48.0	90.0	0	12.8	50.0
Software Configuration												
DBMS (%)	33	0	0	0	0	0	0	0	0	0	100	0
Datacomm. monitors (%)	33	0	0	0	0	0	0	0	0	0	67	0
Primary Programming Language												
APL	0	0	0	0	0	0	0	0	0	0	0	0
BASIC	0	0	0	0	0	17	80	20	0	0	67	14
COBOL	0	0	31	83	50	0	0	0	33	0	0	14
FORTRAN	100	0	0	0	0	0	0	40	33	0	0	57
RPG	0	0	0	0	0	0	0	0	17	0	0	14
Other	0	100	100	17	75	83	20	0	0	0	0	0
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	0	0	8	23	50	0	40	20	17	0	0	14
Proprietary Software	0	0	8	15	0	0	20	40	17	0	33	29
Expanded Datacomm	33	0	8	8	25	0	40	20	33	0	33	29
Distributed Processing	33	0	0	5	0	0	0	0	0	0	0	14
Integrated Word Processing	0	0	0	0	0	0	0	0	0	0	0	0
Other	0	10	0	0	0	0	0	0	0	0	0	0
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	0	0	38	20	25	17	0	20	17	0	0	29
Yes, different manufacturer	0	30	24	13	0	17	20	20	33	100	0	0
No	100	70	38	63	75	17	80	60	67	0	100	71

Survey Item / Manufacturer and Model	MODCOMP (other models)	NCR 399	NCR Century 50 thru 100	NCR 8200	NCR 8300	NCR (other SBC models)	Nixdorf 8870	Perkin-Elmer 6/16, 7/16 & 8/16	Perkin-Elmer 7/32 & 8/32	Philips P-350 Series	Pick & Associates Evolution	Prime Computer 300 & 350
Significant Problems (%)												
System proposed by vendor was too small	33	20	8	28	0	0	20	20	33	50	0	57
Delivery and/or installation of equipment was late	0	20	15	28	50	33	0	0	33	50	0	0
Delivery of required software was late	0	30	8	23	0	33	0	0	33	50	0	0
System costs exceeded expected total	33	20	8	13	25	0	0	20	17	0	0	0
Vendor did not provide all promised software or support	100	50	8	18	25	33	0	0	17	0	0	0
Program/data compatibility not what vendor promised	0	20	0	15	0	0	20	0	0	0	0	14
Terminals/peripherals compatibility not what vendor promised	0	0	0	0	25	0	0	0	0	0	0	0
Vendor enhancements/changes to hardware/software hard to keep up with	33	0	8	13	0	17	20	0	17	0	0	—
Equipment Excessively Noisy	0	20	31	15	0	17	0	0	17	50	0	14
Power/Ceiling requirements excessive	0	0	15	10	0	0	0	0	0	0	0	14
Other	33	0	23	15	0	33	0	40	17	0	0	29
Significant Advantages (%)												
Users happy with response time	0	10	8	33	75	0	0	40	0	50	100	57
System easy to expand/reconfigure	33	0	15	48	50	0	40	20	33	0	100	100
System costs less than expected	0	0	8	3	0	0	80	0	0	50	33	—
Programs/data compatible, as vendor promised	0	0	15	18	75	17	0	40	0	0	33	29
Terminals/peripherals compatible, as vendor promised	33	0	0	13	25	0	0	40	0	0	33	29
System is power/energy efficient	0	10	0	15	25	0	0	20	0	0	0	14
Productivity aids help us keep programming costs down	0	10	0	13	0	0	0	0	0	0	100	—
Database language effective	33	10	0	18	0	17	40	0	0	0	100	29
Delivery and/or installation of equipment was ahead of schedule	0	0	0	3	25	17	20	0	0	50	33	14
Delivery and/or installation fo software was ahead of schedule	0	0	0	5	0	0	0	0	0	0	0	14
Other	0	0	0		0	17	0	20	0	50	0	—
System Ratings (4.0-0.0)												
Ease of operation	3.0	2.7	2.9	3.3	3.3	3.2	3.4	3.2	2.8	3.5	4	3.7
Reliability of Mainframe	3.3	3.3	3.2	3.4	3.5	3.3	3.6	3.8	2.8	2.5	3.7	3.6
Reliability of Peripherals	2.3	3.1	3.1	2.9	3.0	3.3	3.4	3.4	2.7	2.0	3.3	3.0
Maintenance service:												
Responsiveness	1.3	3.1	2.9	3.1	3.3	3.3	3.0	3.2	3.3	3.0	3.7	3.6
Effectiveness	3.0	3.0	2.9	2.8	3.3	3.6	3.0	3.0	2.3	2.5	3.7	3.1
Technical support:												
Trouble-shooting	1.3	3.0	2.5	2.4	2.8	3.0	2.8	2.8	2.2	2.5	4	2.9
Education	1.6	2.8	2.5	2.4	2.8	2.5	2.6	2.3	2.0	1.5	3.3	2.4
Documentation	1.3	2.7	2.5	2.3	3.3	2.5	2.8	2.3	1.5	2.0	3.0	2.3
Manufacturer's software:												
Operating system	2.3	2.4	3.3	2.7	4.0	2.8	2.4	3.2	2.0	3.0	4.0	3.1
Compilers & Assemblers	2.0	2.1	3.1	2.9	3.3	3.0	3.0	2.8	2.7	—	4.0	2.9
Applications Programs	2.0	1.8	2.5	2.7	3.3	2.7	3.4	3.0	1.8	2.0	4.0	2.7
Ease of programming	2.3	2.3	2.9	2.9	3.7	2.8	3.3	3.3	2.0	1.0	3.7	3.6
Ease of conversion	1.0	1.8	2.8	2.5	2.7	2.2	3.0	3.0	2.4	1.0	3.3	2.7
Overall satisfaction	2.0	2.4	3.2	2.8	3.0	3.6	3.0	3.2	3.0	2.0	4.0	3.1
Would you recommend system to another user? (%)												
Yes	33	20	54	65	100	50	80	100	67	0	100	86
No	67	80	64	35	0	33	20	0	33	100	0	14

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. . . Score Machines for Satisfaction

Survey Item / Manufacturer and Model	Prime Computer 400 & 500	Prime Computer 550, 650, 750	Qantel 960 & 970	Qantel 1400 & 1450	Systems (SEL) (all models)	Tandem T-16	Texas Instruments 990 Series	Texas Instruments (other models)	Univac BC/7 Series	Univac V70 & V77 Series	Univac 9200	Univac 9300
No. of User Responses	16	16	8	5	3	10	46	5	14	11	8	8
No. of Systems Represented	18	18	8	5	14	17	62	9	16	20	8	4
Avg. Life of System (Mos.)	23.6	11.0	17.2	32.6	49.3	15.7	163.0	19.0	21.0	48.9	104.8	104.8
Acquisition Method (%)												
Purchase	75	44	88	80	67	60	93	80	43	91	75	50
Rental	0	0	0	20	0	0	2	0	21	0	0	0
Lease	25	44	12	20	33	40	4	20	29	9	25	50
Principal Applications (%)												
Accounting	50	50	88	80	0	10	65	80	79	27	88	75
Construction	6	6	0	0	0	0	2	20	14	0	0	0
Education	31	6	0	0	0	10	4	0	0	0	12	0
Government	0	25	0	0	100	0	0	0	14	0	38	25
Manufacturing	19	12	38	20	0	0	13	20	21	18	38	0
Payroll/Personnel	31	19	25	60	0	20	41	40	71	9	63	25
Service Bureaus	12	37	0	0	0	0	19	20	14	0	12	0
Transportation	0	0	0	20	0	0	6	0	0	18	0	0
Word Processing	31	37	50	20	0	20	24	80	21	9	0	0
Banking/Finance	0	12	0	0	0	30	4	20	0	18	0	0
Distributed Processing	0	19	0	20	33	10	15	0	7	9	0	0
Engineering/Scientific	37	12	0	0	67	10	4	0	0	27	0	0
Insurance	0	6	12	0	0	0	2	0	0	9	0	25
Medical/Health Care	6	6	0	0	0	10	6	20	7	9	0	0
Retail	0	19	0	0	0	0	13	20	7	0	12	0
Transaction Processing	12	19	0	40	0	50	15	0	0	45	0	0
Utilities-Power	0	0	0	0	0	0	4	0	0	0	0	0
Other	0	0	50	20	0	0	19	0	0	0	25	0
Source of Applications Prog. (%)												
In-house personnel	94	75	63	80	67	70	74	60	71	81	100	100
"Ready-made" programs from manufacturer	25	19	75	20	0	20	6	0	50	0	0	0
Contract Programming	43	19	50	40	67	50	26	20	29	36	12	0
Manufacturer's Personnel	0	0	0	20	0	0	0	0	29	9	12	0
Proprietary Software Packages	56	50	38	40	0	50	37	40	21	45	0	0
Other	0	0	0	0	0	0	4	0	0	0	0	0
Hardware Configuration												
No. of CPUs	18	18	8	5	14	50	64	5	16	21	8	4
No. of Workstations (avg.)	421.0	186.0	2.3	5.4	4.2	512.0	184.0	11.0	2.7	8.0	0	0
Software Configuration												
DBMS (%)	0	0	0	20	0	0	0	0	0	54	0	0
Datacomm monitors (%)	0	0	0	0	33	0	0	0	0	73	0	0
Primary Programming Language												
APL	0	0	0	0	0	0	0	0	0	0	0	0
BASIC	19	19	88	80	0	0	26	60	0	0	0	0
COBOL	31	44	0	0	0	50	59	0	0	36	0	25
FORTRAN	75	69	0	0	100	10	9	0	0	36	0	0
RPG	6	0	0	0	0	0	15	0	100	9	50	100
Other	0	0	0	40	67	0	0	0	0	46	50	0
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	25	31	25	0	0	50	24	20	36	0	50	0
Proprietary Software	31	44	25	0	0	20	41	40	7	9	0	0
Expanded Datacomm	31	31	0	20	0	70	35	20	21	18	25	0
Distributed Processing	12	6	0	0	0	20	24	20	0	9	0	0
Integrated Word Processing	19	19	12	0	0	10	19	100	14	0	0	0
Other	0	0	0	0	0	0	11	0	0	0	0	0
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	12	0	12	0	0	0	13	20	0	0	38	0
Yes, different manufacturer	0	0	0	0	0	0	0	0	21	18	24	75
No	81	94	75	100	100	100	78	80	79	82	38	25

Prime Computer 400 & 500	Prime Computer 550, 650, 750	Qantel 960 & 970	Qantel 1400 & 1450	Systems (SEL) (all models)	Tandem T-16	Texas Instruments 990 Series	Texas Instruments (other models)	Univac BC/7 Series	Univac V70 & V77 Series	Univac 9200	Univac 9300	Survey Item / Manufacturer and Model
												Significant Problems (%)
12	12	12	40	67	10	9	20	43	18	25	25	System proposed by vendor was too small
6	6	12	0	33	0	19	0	14	27	0	0	Delivery and/or installation of equipment was late
19	0	25	20	33	0	6	20	21	18	0	0	Delivery of required software was late
0	0	0	0	0	10	0	0	0	18	0	0	System costs exceeded expected total
19	6	25	20	33	30	11	0	35	36	0	0	Vendor did not provide all promised software or support
6	12	12	0	0	10	4	0	7	9	0	0	Program/data compatibility not what vendor promised
6	0	0	0	33	0	0	0	7	18	0	0	Terminals/peripherals compatibility not what vendor promised
6	0	12	0	0	20	9	0	7	27	0	0	Vendor enhancements/changes to hardware software hard to keep up with
0	0	0	0	33	0	2	0	7	0	38	100	Equipment excessively noisy
0	0	0	0	0	0	0	0	7	0	12	75	Power/Cooling requirements excessive
12	6	50	0	0	0	11	40	7	36	25	0	Other
												Significant Advantages (%)
62	81	75	60	0	40	52	80	29	36	0	25	Users happy with response time
87	75	88	100	33	90	65	40	64	0	0	0	System easy to expand/reconfigure
6	12	12	0	0	0	17	20	7	0	0	0	System costs less than expected
43	50	0	60	0	0	28	20	29	9	38	0	Programs/data compatible, as vendor promised
25	44	0	40	33	10	13	40	7	18	12	0	Terminals/peripherals compatible, as vendor promised
43	37	25	40	0	30	26	60	7	0	0	0	System is power/energy efficient
43	31	25	60	0	50	37	60	50	18	0	0	Productivity aids help us keep programming costs down
12	44	50	60	0	60	11	20	7	9	0	0	Database language effective
12	25	12	40	0	40	17	20	7	9	12	0	Delivery and/or installation of equipment was ahead of schedule
12	6	12	0	0	0	13	20	7	0	12	0	Delivery and/or installation of software was ahead of schedule
6	6	12	0	0	20	4	0	0	18	0	0	Other
												System Ratings (4.0-0.0)
3.8	3.8	3.6	3.6	1.7	3.6	3.5	4.0	3.1	2.9	3.0	3.0	Ease of operation
3.8	3.6	3.4	3.6	3.7	3.9	3.6	3.6	3.0	2.4	2.6	3.2	Reliability of Mainframe
3.3	3.0	3.1	3.1	2.3	3.3	3.5	3.6	2.5	3.2	2.4	2.2	Reliability of Peripherals
												Maintenance service:
3.1	3.0	3.6	3.2	1.3	3.4	3.1	3.0	2.9	2.5	2.8	3.0	Responsiveness
3.0	2.9	3.4	3.1	2.0	4.6	3.2	2.3	2.6	2.2	2.5	3.2	Effectiveness
												Technical support:
3.1	3.2	3.0	3.0	1.5	3.1	2.9	3.2	2.5	2.2	2.4	2.0	Trouble-shooting
2.5	2.7	2.4	2.2	2.3	3.2	2.4	2.8	2.0	1.7	2.4	2.0	Education
2.7	2.9	2.6	2.8	1.3	2.9	3.4	2.8	2.0	1.9	2.1	2.0	Documentation
												Manufacturer's software:
3.7	3.7	3.4	3.6	1.7	3.7	3.3	3.6	2.7	2.5	2.6	2.0	Operating system
3.4	3.6	3.5	3.2	2.3	3.6	3.3	3.0	2.4	2.2	2.5	1.0	Compilers & Assemblers
3.2	2.9	3.1	3.0	1.0	3.2	2.8	3.5	2.6	2.2	2.0	0	Applications Programs
3.3	3.6	3.7	3.6	1.6	3.3	3.3	3.8	2.9	2.5	2.8	2.2	Ease of programming
3.1	3.3	3.3	3.5	1.5	3.0	3.0	3.3	2.7	2.7	2.6	2.0	Ease of conversion
3.6	3.6	3.5	3.2	2.0	3.8	3.4	3.5	2.9	2.6	2.7	2.0	Overall satisfaction
												Would you recommend system to another user? (%)
100	100	100	60	33	100	96	100	71	45	27	0	Yes
0	0	0	40	33	0	4	0	29	55	33	100	No

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Word Processing
COBOL Processing
Remote Batch
PWS Programmer Work Station
Source Data Entry
3270 Central Inquiry

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One system does the work of several with our powerful Multifunction Executive.

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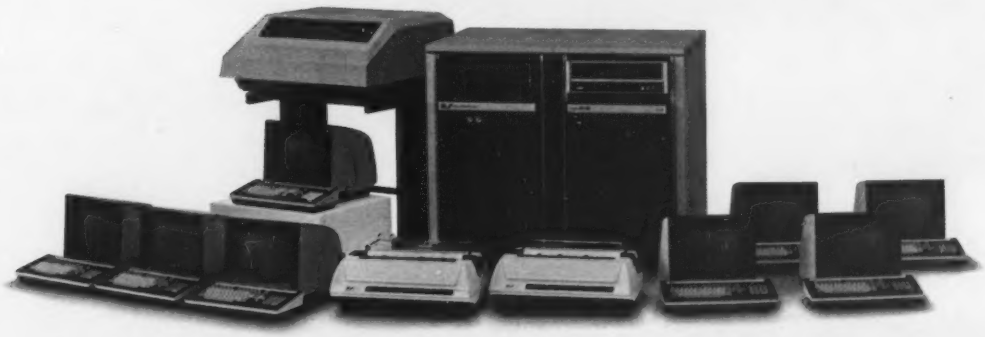

Four-Phase Systems
The Distributed Processing Company

Minis, Small Business Computers Rated . . .

Manufacturer and Model / Survey Item	Wang Labs 2200T	Wang Labs 2200VP	Wang Labs 2200VS	Wang Labs 2200MVP	Wang Labs 2200, unspecified	Wang Labs (other models)	Minis SBC (other vendors)
No. of User Responses	5	8	29	22	5	9	50
No. of Systems Represented	6	48	35	34	15	17	107
Avg. Life of System (Mos.)	37.0	33.0	12.0	16.0	35.0	17.0	25.3
Acquisition Method (%)							
Purchase	80	75	57	82	88	67	78
Rental	0	12	18	14	0	22	6
Lease	20	14	25	4	12	11	16
Principal Applications (%)							
Accounting	60	50	48	73	63	22	52
Construction	0	13	14	14	12	11	4
Education	0	25	0	0	0	0	4
Government	0	13	7	0	0	0	4
Manufacturing	20	13	10	18	25	11	16
Payroll/Personnel	60	50	28	45	25	11	40
Service Bureaus	0	25	17	18	0	0	8
Transportation	0	0	3	0	0	0	2
Word Processing	20	13	34	36	12	44	32
Banking/Finance	20	25	7	9	12	0	4
Distributed Processing	0	0	14	5	0	0	10
Engineering/Scientific	0	0	7	5	25	33	14
Insurance	0	0	10	5	12	22	4
Medical/Health Care	0	0	14	0	0	0	12
Retail	40	0	7	9	12	0	4
Transaction Processing	0	13	17	5	38	0	8
Utilities-Power	0	0	0	0	0	0	2
Other	20	13	17	23	25	0	32
Source of Applications Prog. (%)							
In-house personnel	20	88	79	68	63	44	64
"Ready-made" programs from manufacturer	20	25	10	9	0	55	44
Contract Programming	60	50	31	32	63	0	24
Manufacturer's Personnel	0	0	0	0	0	0	2
Proprietary Software Packages	40	25	28	55	12	33	6
Other	0	0	3	5	12	11	0
Hardware Configuration							
No. of CPU's	6	48	35	34	15	17	119
No. of Workstations (avg.)	1.8	2.0	7.0	2.6	1.0	9.0	9.3
Software Configuration							
DBMS (%)	0	13	17	23	25	33	12
Datacomm monitors (%)	0	13	10	5	12	0	8
Primary Programming Language							
APL	0	0	0	0	0	0	2
BASIC	100	75	21	86	88	44	30
COBOL	0	0	83	0	0	0	16
FORTRAN	0	0	0	0	0	0	24
RPG	0	0	31	0	0	0	14
Other	0	0	10	0	0	11	36
Planned Acquisitions/Implementations for 1980 (%)							
Additional software from manufacturer	40	13	24	14	0	11	24
Proprietary Software	40	0	34	41	12	0	14
Expanded Datacomm	20	25	52	40	25	0	26
Distributed Processing	0	25	14	14	12	11	10
Integrated Word Processing	20	0	45	9	12	11	24
Other	0	13	17	14	12	33	12
Plans for system replacement in 1980 (%)							
Yes, same manufacturer	20	0	3	0	0	11	8
Yes, different manufacturer	0	25	0	0	25	11	22
No	80	75	86	100	63	66	76

Wang Labs 2200T	Wang Labs 2200 VP	Wang Labs 2200 VS	Wang Labs 2200 MVP	Wang Labs 2200, unspecified	Wang Labs (other models)	Minis & SBC other vendors	Manufacturer and Model / Survey Item
							Significant Problems (%)
0	25	3	9	25	11	20	System proposed by vendor was too small
0	0	24	14	25	11	16	Delivery and/or installation of equipment was late
0	0	10	0	25	11	12	Delivery of required software was late
0	25	0	18	12	0	10	System costs exceeded expected total
20	38	14	0	25	22	16	Vendor did not provide all promised software or support
0	13	3	5	12	0	6	Program/data compatibility not what vendor promised
0	13	3	9	0	0	2	Terminals/peripherals compatibility not what vendor promised
0	0	14	9	25	11	10	Vendor enhancements/changes to hardware software hard to keep up with
0	25	7	9	25	0	8	Equipment excessively noisy
0	0	0	5	12	0	12	Power/Cooling requirements excessive
40	13	7	5	38	0	26	Other
							Significant Advantages (%)
0	75	55	59	38	44	46	Users happy with response time
0	63	69	82	63	22	44	System easy to expand/reconfigure
20	0	10	5	12	0	10	System costs less than expected
0	13	34	50	0	11	28	Programs/data compatible, as vendor promised
0	13	0	36	0	0	26	Terminals/peripherals compatible, as vendor promised
0	25	24	27	25	22	16	System is power/energy efficient
20	50	76	32	0	11	12	Productivity aids help us keep programming costs down
0	13	10	14	0	11	18	Database language effective
20	0	10	14	0	11	6	Delivery and/or installation of equipment was ahead of schedule
0	0	7	14	0	0	4	Delivery and/or installation of software was ahead of schedule
0	13	0	9	0	11	8	Other
							System Ratings (4.0-0.0)
4.0	3.3	3.8	3.9	3.4	3.5	3.3	Ease of operation
3.2	3.4	3.7	3.6	3.4	3.2	3.2	Reliability of Mainframe
3.4	3.1	3.4	3.0	3.3	3.1	3.0	Reliability of Peripherals
							Maintenance service:
3.0	3.1	3.1	2.9	2.1	2.4	2.8	Responsiveness
2.8	3.0	3.2	2.9	2.3	2.5	2.8	Effectiveness
							Technical support:
2.6	2.8	2.9	2.9	2.0	2.4	2.6	Trouble-shooting
1.8	2.3	2.2	2.5	2.0	2.5	2.3	Education
2.8	2.6	2.3	2.5	2.1	2.9	2.2	Documentation
							Manufacturer's software:
4.0	3.3	3.6	3.1	2.8	3.2	3.2	Operating system
4.0	3.2	3.5	3.6	3.0	3.0	3.2	Compilers & Assemblers
2.3	3.0	3.2	2.6	2.3	3.0	2.9	Applications Programs
4.0	3.3	3.8	3.6	3.3	3.2	3.1	Ease of programming
4.0	2.8	3.3	3.3	2.0	3.1	3.0	Ease of conversion
3.0	3.3	3.6	3.4	2.9	3.3	3.1	Overall satisfaction
							Would you recommend system to another user? (%)
80	88	100	91	75	88	80	Yes
20	12	0	9	25	11	18	No

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. . . Then Desktops, Personals and Micros

Survey Item / Manufacturer and Model	Alpha Micro AM-100	Altos ACS 8000 Series	Apple II (all models)	Commodore (all models)	Cromemco System Three	Cromemco Z-2 (all models)	Data General MicroNova	DEC LSI-11	Heath (all models)	Hewlett-Packard 9830A	IBM 5100	IBM 5110
No. of User Responses	17	4	38	12	4	8	8	7	7	4	10	21
No. of Systems Represented	19	8	47	86	8	8	15	24	9	11	28	34
Avg. Life of System (Mos.)	24.0	15.0	12.0	15.6	19.0	19.3	10.7	19.9	11.1	60.5	42.8	20.8
Acquisition Method (%)												
Purchase	100	75	100	100	100	100	89	86	100	100	100	90
Rental	0	0	0	0	0	0	0	0	0	0	0	5
Lease	0	25	0	0	0	0	11	14	0	0	0	5
Principal Applications (%)												
Accounting	76	25	34	50	75	38	44	42	43	75	40	52
Construction	12	0	0	0	25	0	0	0	0	25	0	0
Education	0	50	37	33	25	0	0	14	0	25	0	14
Government	0	0	5	8	25	0	0	0	0	0	0	0
Manufacturing	5	0	3	8	0	13	11	14	0	50	10	14
Payroll/Personnel	41	0	5	0	50	25	22	29	0	25	40	33
Service Bureaus	12	0	0	0	0	0	0	0	29	0	0	10
Transportation	0	0	0	0	0	0	0	0	0	25	0	0
Word Processing	76	75	26	42	75	38	33	29	14	0	20	5
Banking/Finance	0	0	5	0	0	25	0	0	0	25	10	0
Distributed Processing	0	0	5	8	0	0	11	0	14	0	0	5
Engineering/Scientific	24	0	11	25	25	25	22	14	0	50	20	0
Insurance	0	0	3	0	0	0	0	0	0	0	30	14
Medical/Health Care	5	0	3	0	0	0	22	0	0	0	0	10
Retail	5	0	8	0	50	13	22	14	0	0	20	14
Transaction Processing	5	0	0	8	25	13	11	14	0	0	10	5
Utilities-Power	0	0	0	0	0	0	0	0	0	0	0	0
Other	24	50	45	0	0	38	22	14	43	0	30	38
Source of Applications Prog. (%)												
In-house personnel	76	100	76	67	100	100	89	71	86	75	80	76
"Ready-made" programs from manufacturer	41	50	47	17	25	0	11	14	57	75	30	24
Contract Programming	18	0	5	8	50	0	22	29	14	25	10	19
Manufacturer's Personnel	0	0	0	0	0	0	11	0	0	0	0	0
Proprietary Software Packages	29	75	37	17	50	38	22	0	0	50	0	14
Other	0	0	11	33	0	0	0	0	0	0	0	0
Hardware Configuration												
No. of CPUs	19	5	47	56	6	8	15	29	8	11	28	34
No. of Workstations (avg.)	2.8	1.2	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Software Configuration												
DBMS (%)	0	0	0	0	0	0	11	0	0	0	0	0
Datacomm monitors (%)	0	0	0	0	0	0	11	0	0	0	0	0
Primary Programming Language												
APL	0	0	0	0	0	0	0	0	0	0	60	10
BASIC	88	100	79	100	50	50	44	29	100	50	50	76
COBOL	0	75	0	0	75	25	0	0	0	0	0	0
FORTRAN	0	50	0	0	75	50	44	0	14	0	0	0
RPG	0	0	0	0	0	0	0	0	0	0	0	0
Other	12	25	0	17	25	38	22	42	43	0	10	0
Planned Acquisitions/Implementations for 1980 (%)												
Additional software from manufacturer	24	50	26	17	50	13	11	42	29	0	0	0
Proprietary Software	47	75	42	33	75	25	22	14	0	25	10	5
Expanded Datacomm	41	0	8	25	25	25	11	14	0	0	10	10
Distributed Processing	29	0	8	0	0	13	0	14	0	0	0	5
Integrated Word Processing	12	25	8	25	25	25	0	14	29	0	0	14
Other	12	0	0	25	0	0	22	0	0	0	30	5
Plans for system replacement in 1980 (%)												
Yes, same manufacturer	5	0	0	17	0	13	11	14	0	0	20	14
Yes, different manufacturer	12	0	0	8	0	0	22	0	0	0	10	8
No	82	100	84	67	100	87	67	58	100	75	70	71

Alpha Micro AM-100	Altos ACS 8000 Series	Apple II (all models)	Commodore (all models)	Cromemco System Three	Cromemco Z-2 (all models)	Data General MicroNova	DEC LSI-11	Heath (all models)	Hewlett-Packard 9830A	IBM 5100	IBM 5110	Manufacturer and Model / Survey Item
												Significant Problems (%)
0	0	2	0	25	0	0	0	0	25	30	19	System proposed by vendor was too small
18	0	2	17	25	13	11	42	67	25	0	5	Delivery and/or installation of equipment was late
12	25	5	8	25	0	11	14	43	0	0	0	Delivery of required software was late
12	0	11	0	0	0	11	0	0	0	0	10	System costs exceeded expected total
29	0	5	17	0	0	0	14	29	0	10	0	Vendor did not provide all promised software or support
12	25	0	17	0	0	11	0	0	0	0	10	Program/data compatibility not what vendor promised
12	0	0	8	0	0	0	14	0	25	0	0	Terminals/peripherals compatibility not what vendor promised
24	25	5	17	25	13	0	0	0	0	0	0	Vendor enhancements/changes to hardware/software hard to keep up with
12	0	0	0	0	0	11	0	14	25	0	5	Equipment Excessively Noisy
0	0	0	0	0	0	0	0	0	0	0	0	Power/Cooling requirements excessive
12	25	13	25	25	0	22	14	0	0	10	24	Other
												Significant Advantages (%)
71	75	39	50	0	50	22	71	43	25	20	43	Users happy with response time
71	50	61	25	75	38	33	0	43	0	10	24	System easy to expand/reconfigure
18	25	24	17	25	25	22	14	43	0	10	10	System costs less than expected
12	25	0	0	25	38	0	14	29	0	0	10	Programs/data compatible, as vendor promised
29	0	5	8	50	38	11	14	29	0	0	0	Terminals/peripherals compatible, as vendor promised
35	0	39	50	0	25	22	29	29	0	10	43	System is power/energy efficient
24	0	11	0	0	25	0	14	0	0	0	14	Productivity aids help us keep programming costs down
0	0	8	0	0	0	0	0	0	0	10	14	Database language effective
12	0	5	0	25	13	11	0	0	0	10	19	Delivery and/or installation of equipment was ahead of schedule
12	0	5	0	0	13	11	0	0	0	10	5	Delivery and/or installation of software was ahead of schedule
0	25	11	25	0	0	11	0	0	0	0	9	Other
												System Ratings (4.0-0.0)
3.2	3.8	3.6	3.3	3.8	3.7	3.3	4.0	3.4	3.8	3.4	3.2	Ease of operation
3.2	3.5	3.7	3.3	3.5	3.8	3.0	4.0	3.6	3.8	3.5	3.6	Reliability of Mainframe
3.1	3.5	3.3	2.9	2.5	3.3	2.8	3.4	3.2	3.5	3.3	3.5	Reliability of Peripherals
												Maintenance service:
2.8	3.0	3.1	2.1	3.3	3.6	3.3	3.0	2.2	3.6	3.5	3.2	Responsiveness
2.9	2.7	3.2	2.5	3.0	3.3	3.3	3.0	3.4	3.6	3.3	3.4	Effectiveness
												Technical support:
3.0	3.0	2.6	2.1	3.3	3.2	2.9	3.0	2.4	3.5	2.8	3.1	Trouble-shooting
2.3	2.5	2.5	1.9	2.8	2.3	2.6	3.0	2.4	3.3	2.1	2.6	Education
2.6	2.0	3.2	1.7	3.0	2.0	2.8	3.0	2.7	3.5	2.4	2.5	Documentation
												Manufacturer's software:
3.4	3.6	3.1	2.9	3.5	3.0	3.1	3.0	2.4	3.3	3.1	2.8	Operating system
3.3	3.6	3.2	3.1	3.5	2.3	2.8	3.2	2.4	—	2.7	2.5	Compilers & Assemblers
2.6	2.6	2.7	2.3	—	2.6	3.1	2.3	—	—	2.5	2.6	Applications Programs
3.5	3.6	3.4	3.2	3.5	3.0	3.0	3.2	3.5	4.0	3.6	3.0	Ease of programming
3.2	3.6	3.1	3.4	—	2.8	2.8	3.0	2.4	—	2.7	2.5	Ease of conversion
3.4	3.8	3.3	3.3	3.0	3.3	3.0	3.5	3.0	3.8	2.7	2.9	Overall satisfaction
												Would you recommend system to another user? (%)
94	100	100	67	100	88	67	100	86	50	30	71	Yes
6	0	0	33	0	12	33	0	14	25	60	29	No

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Users Rate Desktop, Personal, Microcomputers

Survey Item / Manufacturer and Model	IMSAI (all models)	Intel (all models)	North Star Horizon	Ohio Scientific Challenger I/II	Ohio Scientific Challenger III	Pertec (all models)	PolyMorphic Systems	Radio Shack TRS-80 Model I	Radio Shack TRS-80 Model II	Tektronix 4051	Other Personal Computers
No. of User Responses	7	5	12	5	6	8	5	57	13	4	36
No. of Systems Represented	8	9	15	5	7	17	8	110	22	4	83
Avg. Life of System (Mos.)	32.8	15.6	12	8	13.5	21.6	22.8	16.3	6	31.5	12.1
Acquisition Method (%)											
Purchase	100	100	100	100	83	88	80	100	92	100	97
Rental	0	0	0	0	0	12	0	0	0	0	0
Lease	0	0	0	0	0	0	20	0	8	0	3
Principal Applications (%)											
Accounting	71	0	50	60	67	75	60	52	77	0	50
Construction	0	0	8	0	0	12	0	0	6	0	14
Education	14	0	25	0	0	0	0	30	6	50	17
Government	0	0	0	0	0	12	0	4	0	25	3
Manufacturing	0	20	0	0	0	12	0	4	15	0	8
Payroll/Personnel	14	0	17	20	17	50	20	20	42	0	33
Service Bureaus	14	0	33	40	17	0	60	10	0	25	3
Transportation	0	0	0	0	0	0	0	0	0	0	0
Word Processing	43	20	75	60	33	75	60	40	42	0	47
Banking/Finance	0	0	0	0	0	12	0	12	6	0	8
Distributed Processing	14	0	0	0	0	12	0	0	6	0	5
Engineering/Scientific	29	60	17	0	0	0	0	9	23	25	25
Insurance	0	0	0	0	0	12	0	0	0	0	8
Medical/Health Care	0	0	0	40	0	12	40	2	6	0	3
Retail	14	0	0	40	17	38	0	12	31	0	19
Transaction Processing	14	40	17	0	0	12	0	10	15	0	0
Utilities-Power	14	0	0	0	0	0	0	0	0	0	3
Other	29	20	50	20	33	38	20	0	23	0	39
Source of Applications Prog. (%)											
In-house personnel	100	80	92	80	83	62	60	83	85	75	69
"Ready-made" programs from manufacturer	29	40	25	60	17	25	80	48	15	50	47
Contract Programming	0	20	0	20	17	25	20	12	6	25	8
Manufacturer's Personnel	0	0	0	0	0	0	0	4	0	0	3
Proprietary Software Packages	43	20	58	20	33	75	40	39	33	0	61
Other	0	0	0	0	0	12	10	0	0	0	0
Hardware Configuration											
No. of CPUs	8	9	15	5	11	16	8	110	22	0	83
No. of Workstations (avg.)	1	0.6	0.9	1	0.6	1.1	0.7	1	0.6	0	1
Software Configuration											
DBMS (%)	0	0	0	0	0	0	0	0	0	0	8
Datacomm monitors (%)	0	0	0	0	0	0	0	0	0	0	3
Primary Programming Language											
APL	0	0	0	0	0	0	0	0	0	0	0
BASIC	100	20	75	100	50	100	100	56	92	25	69
COBOL	0	0	25	0	17	0	0	0	0	0	8
FORTRAN	0	60	25	0	17	0	20	5	0	0	8
RPG	14	0	0	0	0	0	0	0	0	0	0
Other	29	80	50	20	17	0	60	0	46	0	25
Planned Acquisitions/Implementations for 1980 (%)											
Additional software from manufacturer	14	40	17	40	33	12	80	33	33	0	33
Proprietary Software	43	20	58	60	33	62	60	46	70	0	61
Expanded Datacomm	14	20	33	20	17	25	80	16	38	0	13
Distributed Processing	14	0	0	0	0	12	20	2	8	0	6
Integrated Word Processing	29	0	42	20	17	12	20	21	15	0	16
Other	43	20	25	0	17	12	0	0	8	0	27
Plans for System replacement in 1980 (%)											
Yes, same manufacturer	0	0	8	20	0	12	20	12	0	0	13
Yes, different manufacturer	0	0	17	60	17	0	0	16	8	0	6
No	86	100	66	0	67	86	80	61	85	75	91

Survey Item / Manufacturer and Model	IMSAI (all models)	Intel (all models)	North Star Horizon	Ohio Scientific Challenger I/II	Ohio Scientific Challenger III	Pertec (all models)	PolyMorphic Systems	Radio Shack TRS-80 Mdl I	Radio Shack TRS-80 Mdl II	Tektronix 4051	Other Personal Computers
Significant Problems (%)											
System proposed by vendor was too small	14	0	8	0	0	0	0	7	8	0	8
Delivery and/or installation of equipment was late	14	0	42	0	17	25	0	12	46	0	16
Delivery of required software was late	14	0	8	0	0	0	0	12	8	0	19
System costs exceeded expected total	0	20	8	0	17	12	40	5	8	0	0
Vendor did not provide all promised software or support	0	0	0	0	33	25	0	7	8	0	14
Program/data compatibility not what vendor promised	0	0	0	0	17	0	0	7	0	0	3
Terminals/peripherals compatibility not what vendor promised	0	0	0	0	17	0	0	2	0	0	0
Vendor enhancements/changes to hardware/software hard to keep up with	0	20	0	0	0	0	40	12	15	0	3
Equipment Excessively Noisy	0	0	0	0	0	25	0	5	8	0	6
Power/Cooling requirements excessive	0	0	0	0	0	0	0	2	0	0	0
Other	14	0	8	0	33	25	0	20	15	0	22
Significant Advantages (%)											
Users happy with response time	29	20	25	100	17	12	60	30	31	25	44
System easy to expand/reconfigure	57	20	58	80	33	38	80	30	31	75	67
System costs less than expected	14	0	17	0	17	25	0	24	15	0	39
Programs/data compatible, as vendor promised	14	0	25	40	17	12	0	7	15	0	25
Terminals/peripherals compatible, as vendor promised	14	0	17	0	0	12	20	4	0	0	22
System is power/energy efficient	0	0	17	60	33	50	60	39	23	0	58
Productivity aids help us keep programming costs down	0	20	0	0	17	0	40	12	8	0	14
Database language effective	0	0	8	40	17	12	20	7	8	25	6
Delivery and/or installation of equipment was ahead of schedule	0	0	0	40	0	12	20	10	0	0	17
Delivery and/or installation of software was ahead of schedule	0	0	0	0	0	0	0	2	0	0	0
Other	0	20	8	0	17	0	0	7	0	0	11
System Ratings (4.0-0.0)											
Ease of operation	3.5	2.6	3.4	3.6	3.0	3.6	3.4	3.3	3.4	3.3	3.6
Reliability of Mainframe	3.4	3.0	3.5	3.4	2.7	3.6	3.6	3.2	3.0	4.0	3.7
Reliability of Peripherals	3.1	2.8	3.1	3.2	3.2	3.4	3.6	2.7	2.8	4.0	3.3
Maintenance service:											
Responsiveness	3.3	2.6	1.6	2.8	2.4	2.8	2.8	2.8	2.4	3.5	3.3
Effectiveness	3.7	2.3	2.0	2.8	2.8	2.6	3.4	2.5	2.7	3.5	2.6
Technical support:											
Trouble-shooting	3.0	2.2	2.3	3.0	2.3	2.6	3.0	2.5	1.9	3.0	3.0
Education	3.0	2.5	2.0	2.6	1.8	2.8	2.5	2.5	2.1	2.5	3.6
Documentation	3.0	2.0	2.4	2.0	1.8	2.5	2.8	2.9	2.7	3.3	2.9
Manufacturer's software:											
Operating system	3.0	2.8	3.1	3.6	2.6	2.8	3.8	2.8	2.2	4.0	3.1
Compilers & Assemblers	3.0	2.8	2.6	3.4	2.5	2.5	3.6	2.9	2.4	4.0	3.1
Applications Programs	2.8	2.0	2.2	3.0	2.5	2.0	2.2	2.8	1.7	4.0	3.1
Ease of programming	3.3	2.6	3.1	3.8	3.0	3.0	3.6	3.4	3.4	3.3	3.4
Ease of conversion	2.8	2.3	2.4	3.0	2.7	2.5	2.8	2.8	2.9	3.0	3.3
Overall satisfaction	3.4	2.8	3.1	3.4	2.8	3.0	3.4	3.0	3.0	3.8	3.3
Would you recommend system to another user? (%)											
Yes	71	80	75	100	67	62	100	79	85	100	94
No	29	20	25	0	33	25	0	21	15	0	6

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Check out our Detroit conference schedule:

June 3rd Conference (Exhibit hours: 10:00-5:00)

D-1 8:45-10:00 EXECUTIVE BRIEFING: INFORMATION SYSTEMS PLANNING John Lusa, Editor, *Infosystems Magazine* will make this keynote presentation. He will be joined by a panel of Detroit area EDP executives who will discuss specific cost and productivity improvements they have for 1980/81. Speakers will include Charles H. Fitts, Director of MIS Budd Co., and Carol Gordon, Corporate Systems Manager, Federal Mogul Bearings.

D-2 10:00-11:00 IMPROVING DATA ENTRY PERSONNEL PRODUCTIVITY Wilhelm Kast, President of Datapro Corporation in Southfield, will give you a user viewpoint on data entry productivity.

O-1 11:30-12:30 HOW WORD PROCESSING CAN BREAK THE OFFICE PAPERWORK BOTTLENECK Karen H. Elder, Partner at Central Word Processing Systems, will review the proper combination of people and machines as the key to successful implementation of the automated office.

O-2 11:45-12:45 HOW TO CUT COMMUNICATION COSTS Frank K. Griesinger, President of Frank K. Griesinger Associates in Cleveland, will make this presentation and tell you how to get more for your voice/datacom budget.

M-1 1:30-2:30 AUTOMATION FOR PLANT PRODUCTION AND TESTING APPLICATIONS

F-1 1:30-2:30 SPECIAL PRESENTATION OF MICROGRAPHICS APPLICATIONS Special micrographics and microfilm session will be given in conjunction with the National Micrographics Association.

D-3 3:30-4:30 COMPUTER GRAPHICS: NEW WAYS TO VISUALIZE COMPUTER INFORMATION FOR BUSINESS, ENGINEERING AND RESEARCH USERS

M-2 3:30-4:30 OPTIMIZE MANUFACTURING PRODUCTIVITY VIA SMALL AND LARGE COMPUTER APPLICATIONS

June 4th Conference (Exhibit hours: 10:00-7:30)

O-3 8:45-9:45 COMBINED WORD AND DATA PROCESSING Paul Lowey of Kelly Services and Ronald Reume, President of Resource Data Corporation, will cover the hardware and people obstacles of integrating word and data processing systems.

D-4 10:00-11:00 DATA BASE OPPORTUNITIES IN CENTRALIZED AND DISTRIBUTED SYSTEMS Dr. Robert H. Holland, President of Database Design in Ann Arbor will discuss data base design and applications as key to both centralized and distributed systems.

D-5 11:30-12:30 DISTRIBUTED PROCESSING: USER OPPORTUNITIES IN NETWORK SYSTEMS Dr. Dixon Doll, President of DMW Group, will present a major speech on advanced distributed processing.

D-6 1:30-2:30 FINANCIAL AND MANAGEMENT TECHNIQUES USING EDP TOOLS Dr. Gordon Duke, Professor at Michigan State Graduate School of Business and Barry Frankel, Applied Data Research, will speak.

D-7 3:30-4:30 SMALL AND DESKTOP COMPUTERS FOR BUSINESS AND PROFESSIONAL APPLICATIONS A panel of experienced Detroit area users will tell how they are using personal and microcomputers.

O-4 3:30-4:30 LINKING WORD PROCESSING AND PHOTOTYPESETTING TO CUT REPROGRAPHICS COSTS William D. Green, Accounts Manager at Alphatext and ten-year veteran in data processing and automatic publishing, will give an overview.

June 5th Conference (Exhibit hours: 10:00-5:00)

D-8 8:45-9:45 DISTRIBUTED PROCESSING APPLICATIONS IN DISTRIBUTION-ORIENTED BUSINESS Anne Smyth, Chicago Regional Manager, Distribution Management Systems, will discuss the use of DDP for controlling inventory, order entry and shipping manufacturing, consumer goods and retail distribution.

O-5 10:00-11:00 HOW TO USE COMPUTERIZED TELEPHONE SYSTEMS Albert S. Levenson, President of Detroit Communications Corporation, will speak.

O-6 11:30-12:30 INTEGRATED INFORMATION SYSTEMS Dr. James Carlisle, President of Office of the Future, Inc. will describe how integrated information systems can improve executive and professional productivity by unifying text data bases with important "spinoffs" in electronic mail and teleconferencing.

D-9 11:30-12:30 SELECTING A SMALL BUSINESS COMPUTER: HARDWARE & SOFTWARE Lawrence Feidelman, President of Management Information Corporation and editor of *Small Business Computer News* and *Packaged Software Reports* will make this presentation.

S-1 1:30-2:30 ENHANCING MANAGERIAL/PROFESSIONAL PRODUCTIVITY FOR END USERS Robert M. Howe, V.P., Booz-Allen & Hamilton.

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EDITORIAL

Backward Is Better

The National Computer Conference is great — but it's just too big.

With 600 exhibiting companies occupying 1,600 booths spread over six convention facilities in Anaheim last week, only the most robust could possibly take in all the exhibits and attend the wide-ranging technical sessions.

But the organization was superb — even with the largest crowd ever for a show here, lines were almost nonexistent at the registration area, the crowd flowed smoothly and, except for a few hot spots, the air conditioning held up.

NCC is clearly the gathering of the clans — the largest grouping of computer people from around the world each year. It is the county fair of the computer industry, full of hoopla and old friends meeting to discuss old times as well as the present.

Once a year is not enough, since the computer industry has grown into one of the largest in the world and the crowds overwhelm any convention facility. Several suggestions come to mind for splitting the show into different parts: perhaps one OEM show and one end-user show.

But we would propose a bold step backward. Back to the days of East and West Coast shows, one in the fall and one in the spring. All through its early history, the American Federation of Information Processing Societies (Afips), sponsor of the event, operated this way with the Fall Joint Computer Conference and the Spring Joint Computer Conference — and they worked well until trapped by the recession of 1970-1971.

While the National Computer Conference is truly national — and increasingly international — the vast majority of the attendees still come from the local region. An NCC in Anaheim has a very southern Californian feeling, while one in New York City is definitely East Coast in feel.

By splitting the show on a geographic basis, Afips could give everyone in the industry a chance to attend. In addition, each of the resulting shows would probably be a bit smaller, cutting down on the congestion and hassles that go with the NCC as it is now.

Although we usually urge progressive reforms in the industry, sometimes backward is better. Afips would do the entire industry a favor by taking a massive step backward to the late 1960s and earlier, when it sponsored two shows a year.

LETTERS

IBM Upkeep Costs

It is absurd to suggest that falling quality of maintenance would be a prime reason for increased IBM maintenance costs [CW, May 12]. Let me suggest some other reasons:

First, the rise of large terminal-based networks, whose proper functioning is vital to many businesses, has increased the demand for quality and promptness of maintenance service. These increased performance demands exact their price. It would be hard for IBM to sell some of these systems without assuring prospective buyers of such service.

Second, excessive concern has been fostered with the purchase: rental ratio as a guideline to buyers. Responsible for this shallow view of the computer business have been not only IBM's own sales force, but most computer journalists and security analysts specializing in computer stocks. As a result, the gradual shift of IBM's revenue stream from purchase price to maintenance charges has gone largely unperceived.

Ironically, most IBM salesmen are quite unaware that their own commissions, which are based on points, are now a smaller percentage of the total IBM revenue stream from a product than before.

Harry Nagler
New York, N.Y.

DP Accreditation

I feel compelled to respond to Stan Kupiec's letter "Your Own Gold Mine" [CW, May 5]. He brought up some good points regarding the programming talent available, but I think some discussion is called for.

In the first place, I would sure like to have a list of technical schools around the country that produce highly trained DP people. Unfortunately, many of the schools are out-and-out frauds that simply exist to make money at the expense of their misinformed students and government agencies that provide student grants.

I have recently had a very personal involvement in this problem, since a member of my family is attending a computer operations course at a New Jersey technical school. After three months, she still has not learned any operations and, in fact, had to ask "What does a disk pack look like?" during a recent "off-site" tour of a computer installation.

Both programming and operations instructors are recent graduates of the courses themselves and have no qualifications to teach (much less program). The instruction the students do receive is relevant to the DP industry in 1970.

Unfortunately, I have heard the same problems exist in many of these so-called schools. Kupiec was lucky to find a reputable school, and his company may do very well by tapping the resources from it.

I only wish that either the DP industry itself, or the state governments, would clean up this mess, so firms such as ours would feel comfortable with these graduates. One additional problem that arises in training your own programmers is lack of time. Many companies have the personnel free to spend on this training, while many others will pay the premium of an experienced programmer who will "hopefully" require little supervision.

Other than the problems that I mentioned, Kupiec made a lot of sense.

There are good, eager, bright people available from many of these schools, but with the present conditions in the DP education industry, it is very much like Russian roulette. Perhaps other readers feel the way I do, and a forum could be started in *Computerworld* that might lead to Data Processing Management Association (DPMA) accreditation (or something similiar) in the future.

Thomas W. Scott
Arvada, Calif.

DATA PAST

Five Years Ago
May 28, 1975

NEW YORK — The long-awaited U.S. vs. IBM antitrust trial began here at the U.S. district court. The Justice Department's legal team delivered the opening statement, which dealt with the so-called "old issues" in the case — charges that "IBM monopolized and intended to monopolize the general-purpose electronic digital computer systems market." The government's amended complaint also charged that IBM monopolized and intended to monopolize the related peripherals and leasing markets.

ANAHEIM, Calif. — The Control Data Corp. 38500 mass storage system made its debut at the National Computer Conference here. With media said to be similiar to but not compatible with IBM's 3850, the CDC storage mechanism promised to give users of IBM 370/145s and up another choice for mass storage.

Eight Years Ago
May 24, 1972

ATLANTIC CITY, N.J. — The close of the Spring Joint Computer Conference (JCC) here signaled the end of an era, according to the show's sponsor, the American Federation of Information Processing Societies (Afips). In reaction to the declining number of exhibitors at the spring and fall JCCs held alternately in eastern and western U.S. convention centers, Afips considered holding just one national show per year in greater population centers.

ATLANTIC CITY, N.J. — IBM embarked on a $40 million, five-year project to develop data security options "as near as we can come to the limit of the art" and to make these options available to large users. IBM Chairman T. Vincent Learson told the Spring Joint Computer Conference here that "three highly qualified user installations" and a fourth at IBM would be used to "build a sound body of knowledge and develop some hands-on experience."

SOCIOLOGY OF COMPUTING/Robert L. Glass

May I Have an Act Of God, Please?

It's not often you get to stand up for your rights and please a manager at the same time. But Bobbie Chutzpah managed to do it. In fact, her manager, Malcolm Overkill, may remember this incident as one of his all-time computing experience highs.

Project Sched had been in trouble from the very beginning. It had been oversold and underestimated, and behind it lay a trail of broken digital promises.

When Bobbie joined the team, Sched was well in over its head schedulewise, and Malcolm was in the corporate doghouse.

Now it came to pass, in the manner of a football coach after a losing season, that Malcolm was placed on a management push-down stack, and a fire-breathing troubleshooter named Rumley Powerplay was brought in above him to clean up Sched's act. Rumley had no emotional investment in the success or failure of Sched. His goal was purely to get the job done. Singlemindedly, he set about it.

For his first take-charge act, Rumley set up a series of interviews with the individual members of the technical team. He wanted to find out their overall understanding, and he wanted to find out their specific status. To show that his was a no-nonsense approach, he scheduled these meetings for the upcoming Saturday. Sched's programmers, shocked to the core at this cavalier commandeering of their weekend, realized that Rumley meant business. But they were also angry.

Bobbie Chutzpah, in fact, was so angry that she could have served as an emergency power supply for the corporate computers. Her Saturday plans called for tennis, waterskiing and a romantic interlude with the Robert Redford of the computing installation. Sacrificing those carefully conceived plans for Rumley and Sched was about as satisfying a prospect as being assigned to maintenance of the corporate payroll program. By the time her appointed hour rolled around, Bobbie's violated sense of principles was about as potent as the company's — and Rumley's. The grounds for a classic confrontation were laid.

Interview Scene

Let me set the scene for the interview which followed. Picture an office — Malcolm's office, it was — with a desk dominating the center and Rumley Powerplay seated behind it, exuding confidence. Malcolm, meek as milk toast, sat in a corner, psychologically almost absent, uncomfortable to the hilt. Rumley not only had Malcolm's job, but he had preempted his office and was sitting in his chair. Malcolm appeared almost as a servant, available to Rumley should the new plantation master need his services.

Bobbie was shocked when her turn came, and she entered the room. She could almost imagine that Rumley had just barked out the command "Malcolm! Grovel."

The early part of the interview went well. Bobbie realized that Sched has been deceitfully promoted and she could truthfully tell Rumley what he wanted to hear. Malcolm shifted uncomfortably in his chair, but it was obvious to Bobbie that what she was saying was not really new to either of them. The discussion of Sched history quickly came to an end.

It was on phase two of the interview, Bobbie's own status report, that things ran amuck.

Slowly, Rumley's strategy became apparent. He was seeking, probably from each member of the Sched team, a personal promise to complete Sched

(Continued on Page 68)

READER COMMENTARY/Lindsay L. Baird Jr.

Federal DP Crime Bill: A Much-Needed Measure

Wayne Douglas Bennett's comments in "Arguments Against Crime Bill Don't Hold Up" [CW, April 7] have a great deal of merit. I would like to add my voice and support to obtaining passage of the Federal Computer Systems Protections Act (S. 240), a much-needed piece of legislation.

It appears that the staffs of Sen. Paul Laxalt (R-Nev.) and Orrin G. Hatch (R-Utah) are not doing their homework — let alone keeping the senators informed. There is more than ample evidence supporting the need for computer crime legislation contained in the U.S. Senate Committee on Government Operations reports. It was these reports that prompted Sen. Abraham Ribicoff (D-Conn.) to introduce the Federal Computer Protection Act in 1978 and again in 1979.

I testified on the dimension of the computer crime problem before the Subcommittee on Criminal Laws and Procedures of the Committee on the Judiciary in 1977. Sen. Hatch, the acting chairman of the subcommittee, opened the hearing and then promptly left — staff members then took over. I testified as chairman of the Computer Security Committee, American Society for Industrial Security (Asis).

Recently, I incorporated portions of this testimony in my response to the current committee chairman's request for comments pertaining to an article written by John A. Taber ["On Computer Crime (Senate Bill S. 240)", *Computer Law Journal*, Volume 1, Winter 1979, No. 3.] Taber was one of the four witnesses that spoke against S. 240.

Among the four arguments against the bill's passage listed in Bennett's commentary was "the bill is largely supported by a 'gaggle of commercial firms that specialize in computer security' and others with similar vested interests." Hogwash! The Foreign Corrupt Practices Act contains much more incentive for industry to improve DP security than does S. 240. With or without S. 240, concerned executives will turn to the marketplace for the tools and skills they require to enhance systems audit, control, integrity and security.

Following are excerpts of Baird's letter to Richard H. Krueger, director of corporate security at Digital Equipment Corp. and chairman of

(Continued on Page 64)

HUMAN CONNECTION/Jack Stone

Mini DBMS Aids Research in Doctors' Office

Computer-based medical research, to most DPers, brings to mind some hefty computer machinery churning through masses of medical data, searching for answers to critical medical questions. Furthermore, we tend to associate such efforts with large, university-related hospital centers which have the research talent, facilities and services necessary for the proper conduct of significant projects.

But the minicomputer-oriented data base management system (DBMS) is helping to spread the research wealth around, all the way out to the doctor's office. As a case in point, a group of four physicians in St. Louis, engaged in the private practice of vascular surgery, was able to justify its Wang Laboratories, Inc. 2200VP for research studies and office administration only after it was outfitted with the Aims-II DBMS (OEM by Viacomp Systems, St. Louis).

I interviewed Kathye Gentry, a physician's assistant (PA) and medical researcher employed by the group, on their system's successes.

Q: Kathye, what is a physician's assistant?

A: A PA is a relatively new breed of medical practitioner who provides direct support to the physician. The PA must have a college degree and a minimum of two years' experience in a medically related field. Then the PA must complete a two-year course of study and receive national certification.

Q: Could you tell us a little of your background in the computing field?

A: My experience with computers is similar to that of many people in the field of medical research. We are in the category of "end user" in that we employ the computer as one of many tools to perform our research studies. We understand the basic functions of the machine and its processing tasks, but our interaction is limited to data entry and examination of printout. Knowing about the internal operations of computers — or programming — just hasn't been necessary for me.

Q: Would you describe the research conducted at your office?

A: Glad to. Many patients with vascular diseases require what we call "invasive" diagnostic procedures, which involve the injection of certain dyes into the bloodstream and the outlining of vessels by X-ray devices. These tests give us important information about the nature of a patient's vascular problem, but they sometimes result in undesirable side effects and cause patients discomfort.

Our "noninvasive" laboratory studies involve diagnostic procedures with devices external to the body — such as audio or electronic sensors — for blood flow analyses. We are comparing these laboratory diagnoses with the X-ray results to establish the validity of the tests.

Q: And how is your computer system being used?

A: The machine is assigned to patient billing and collection applications for about two hours a day. Data entry for blood flow analyses occupies another two, and I have it for the balance of the day for the design of computer-based research applications and the retrieval of research results.

Q: Computer systems design? I didn't understand that you had this kind of experience.

A: I didn't before I started, but, as a software management system, Aims has the facilities to allow me to design my own DP applications. It uses a "bouncing ball" type of indicator to drag me through the parameter selection process; I provide the same design specifications I used to give to my systems analyst, but now I hand them over to the machine instead. The system has everything we need for our research, except built-in statistical routines which we plan to add later.

As a matter of fact, a major reason we were able to justify the machine was that we didn't need any part of the usual complement of people that come along with a large computing center. The machine handles the chores of analyst and programmer.

Q: Kathye, you seem quite enthusiastic about your computer system. Ever thought about giving up the rigors of medicine and becoming, well, one of us?

A: Oh, no, never. Sure, I have become more interested in learning to program and finding out more about systems, but a medical career is far more interesting and rewarding. As a PA, I have the opportunity to spend time with patients, working up histories, listening to their problems and educating them on what to expect from various procedures, and this is time that my doctors can't often spare. Without the computer system, we couldn't meet all of our research goals, but in no way does it replace a single "thank you" from a patient.

Federal DP Crime Legislation . . .

(Continued from Page 63)

Asis' Computer Security Committee:

John Taber's contention that S. 240 contains "fatal flaws . . . is a bad bill, a dangerous bill and should be opposed" is in error.

The general thrusts of Taber's arguments are that computer crime is not a problem, larceny and embezzlement are mislabeled as computer crimes, existing criminal law is sufficient for prosecution and unauthorized use of computers by DP professionals is both an established and accepted practice throughout the U.S. Following are my own thoughts.

First, we have a problem of definition: What is a computer crime? True, it is a larceny, embezzlement or fraud committed by an individual, and there are existing laws addressing these crimes. However, utilizing computers in the commission of a crime provides the perpetrator with the ability to divert significant quantities of assets. For example, in the August 1979 issue of *Digital Design*, the Federal Bureau of Investigation reported the following about crimes associated with banking: The average loss in bank robberies is about $3,200, while acts of fraud or embezzlement not involving computers average $23,500. Acts of fraud or embezzlement involving computers result in average losses of $500,000.

In 1974, I co-chaired an American Management Association computer security seminar with a computer manufacturer's representative. During his presentation, he related the results of a year-long (1973) study his company conducted in the area of dishonest DP employees. He reported the following:

- Between 20 and 30 events of dishonest activity were reported each month during the study.
- The average loss per event approximated $674,300.
- Eighty-five percent of the subjects identified in the study were not prosecuted.
- Only one in five of the subjects referred to the courts received a sentence imposing confinement.
- The odds of a person going to jail are one to 33.

Assuming that there were some 125,000 computing systems in place in 1973 and knowing this manufacturer's approximate share of the market, I have estimated that some 400 to 600 computer crimes may have been committed in 1973, resulting in losses of some $270 million to $405 million. Loss projections for 1980, based on 680,000 installed systems, suggest between 1,810 and 2,720 computer crimes will be committed at a cost of $1.2 billion to $1.8 billion.

These projections were based on the assumption that only 15% of such crimes are detected. The actual number of computer crime and associate losses may be grossly understated. The FBI was quoted by *Digital Design* stating that only 1% of computer crimes are detected and of these only 12% are reported to law enforcement authorities.

A note of caution: no one really knows the true dimension of computer crime or abuse. Donn B. Parker's work in the area is frequently quoted by Taber. Parker's main sources of information are newspapers, trade journals and so forth. It is noteworthy that in early 1974 he announced the results of his initial efforts to determine the extent of computer abuse in the U.S. At that time he had data on some 148 instances of computer abuse — the first took place in 1963. However, the hardware manufacturer recorded not less than 240 nor more than 360 unlawful events in just a one-year period. It is apparent that there may be a serious problem, but its true dimensions are as yet unknown.

Existing law and regulations require that crimes and losses be reported to appropriate

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authorities. However, it is a fact of life that business, as well as government, is reluctant to report computer crime. There are several basic reasons for this:

- Embarrassment.
- Bad publicity.
- Risk of revealing other questionable/unlawful activity.
- Possible stockholder lawsuits.
- Securities and Exchange Commission.

This is not speculation on my part, but rather observations based on personal experience. I have worked on somewhere between 20 and 25 "computer crimes" since 1971, and only one of those was reported to authorities for prosecution. Losses ranged from a high of some $17 million to a low of $40,000.

My experience is not unique. There are probably less than a dozen good private practitioners working in the computer crime area. I have discussed with most, if not all, of them the reluctance of victims to report crime to the proper authorities. Without exception, they related that victims were very reluctant to report crime — for the basic reasons stated above.

I have reviewed the annual reports of a number of my clients that had experienced significant losses from a computer-assisted rip-off. Not once did they indicate that a serious erosion of profits resulted from criminal activity of any type. The losses were no doubt conveniently buried in one or more expense items.

Most laws that address white-collar crime (computer crime is now included in that category) prescribe a maximum penalty of five to 10 years' confinement and/or a fine of some thousands of dollars. With unlawful gains derived from computer crime averaging $500,000 or more and the relatively mild criminal penalties confronting a perpetrator, the economics associated with computer abuse are much more of an encouragement than a detriment. Accordingly, S. 240 or similar legislation, authorizing fines of up to 2-½ times the amount diverted and up to 15 years' confinement, is required. Without such legislation, it will be evident to many that crime, especially computer crime, does pay.

Taber also stated that "'Unauthorized' use of computers is widespread among programmers." I agree; however, it is not limited to programmers but rather applies to most DP professionals and to some extent the user communities. He feels that their playing ticktacktoe, drawing calendars and pinup girls, balancing check books, charting stock performance, computing mortgage tables and so forth with their employers' computer resources is harmless.

It may be "harmless," but it still represents in most instances an unauthorized diversion of a valuable company resource for personal use. The argument that curbing such unauthorized computer use is "an intolerable infringement on their [computer professionals'] creative freedom" is without merit. What ever happened to old-fashioned work ethics?

It should be up to the employer to authorize personnel to utilize such resources for "creative" or personal use.

Baird is a management consultant based in Mountain Lakes, N.J.

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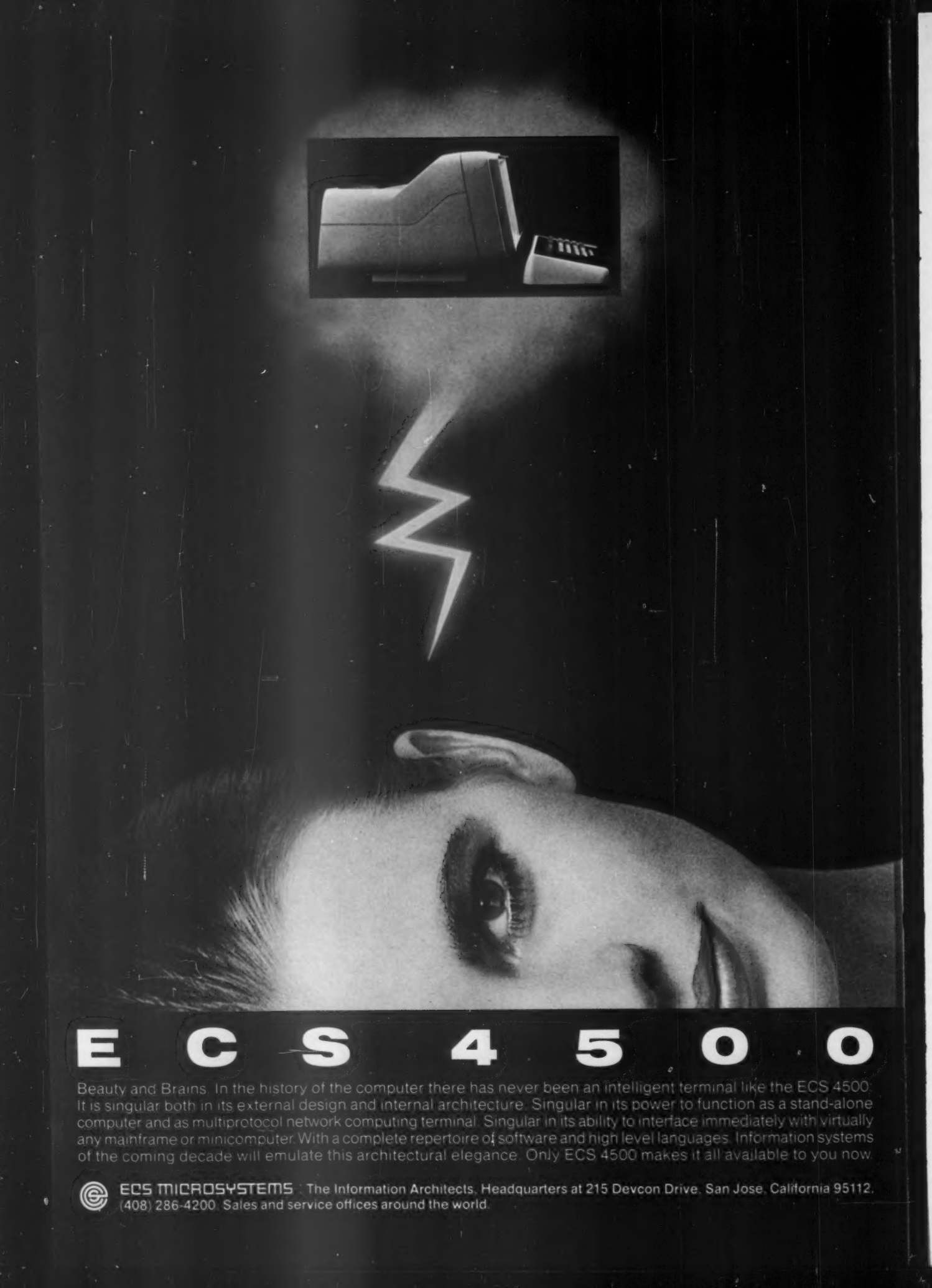

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THE TAYLOR REPORT/Alan Taylor

Lawyers Addressing Noncontractual Rights

It takes time to get a handle on a new situation, but the signs are that lawyers are beginning to get a handle on computer contracting as it is normally practiced in this country. Instead of simply dealing with contract law, where the odds are seriously against the computer buyer, articles such as David Connelly's (Reader Commentary, April 28 and letter, May 19) show an advance in legal attitudes. Some lawyers are finally bringing home to DPers both what noncontractual protections they do have and the need to defend such rights.

When the members of a DP department feel that a vendor has let them down, they complain: "They said the software would be available, and it wasn't," or "The configuration was to handle 24 users, but we could never use it with more than seven."

These and many other user complaints concern some vendor statement or promise that has turned out not to be true, but the user has to live with the results.

Connelly has said that DPers may not have to live with some of these complaints and may be able to seek remedies in the courts, despite anything the contract says.

This is a very different viewpoint and is vastly more realistic than one that goes no further than contract wording — provided that the message gets through. The problem is, because of differences in language and outlook, I am not certain that the message *will* get through.

Connelly uses legal terms such as "unconscionability" and "fraud" that have very different meanings in the worlds of law and computers. For example, fraudulent statements can be made quite innocently by a computer salesman, although to nonlegal minds the very word "fraud" suggests conscious falsifications. To lawyers, it is just a type of behavior that may or may not be conscious. And the less said about lay interpretations of "unconscionability" the better!

Because of these language differences, DPers don't normally pick up the implications of articles such as Connelly's, so let us try to arrive at a commonly understood basis in three areas he touched on — illegal marketing methods, dangerous descriptions and the cost of protection.

Illegal Marketing Methods

In the U.S., businesses are only allowed to operate within certain public-policy limits with respect to their marketing and other operations. These limits change from time to time and from state to state, but do come into play to protect society from bribery, bait-and-switch tactics, overbroad denials of liability for damages caused and various other offensive trading practices which can be found in DP procurement environments.

The effectiveness of U.S. and state court remedies when such illegal actions take place can be spotty, but it can be very effective, ruling out unfair contract clauses or tossing out the contract altogether.

It doesn't matter that the buyer accepted the contract. At stake is the right of the public, and not just the buyer, to be kept free from such "unconscionable" trading practices. The court is protecting this right when it refuses to enforce contracts obtained with improper methods against the computer user.

Dangerous Data

Within the category of improper behavior, another whole area deals with truthfulness and completeness of information available to the buyer. Specifications, proposals, claims to know that equipment will fit and so forth are the subject of a separate right — the right to be honestly and openly informed during contract preparations.

Again, society takes an interest here, because the overhead of having to totally distrust anything you can't see and weigh would be too much for effective and economic commerce in many areas, including DP.

Society intervenes by protecting the buyers from lies, from mistakes and from not being forewarned of dangers that they can't see for themselves.

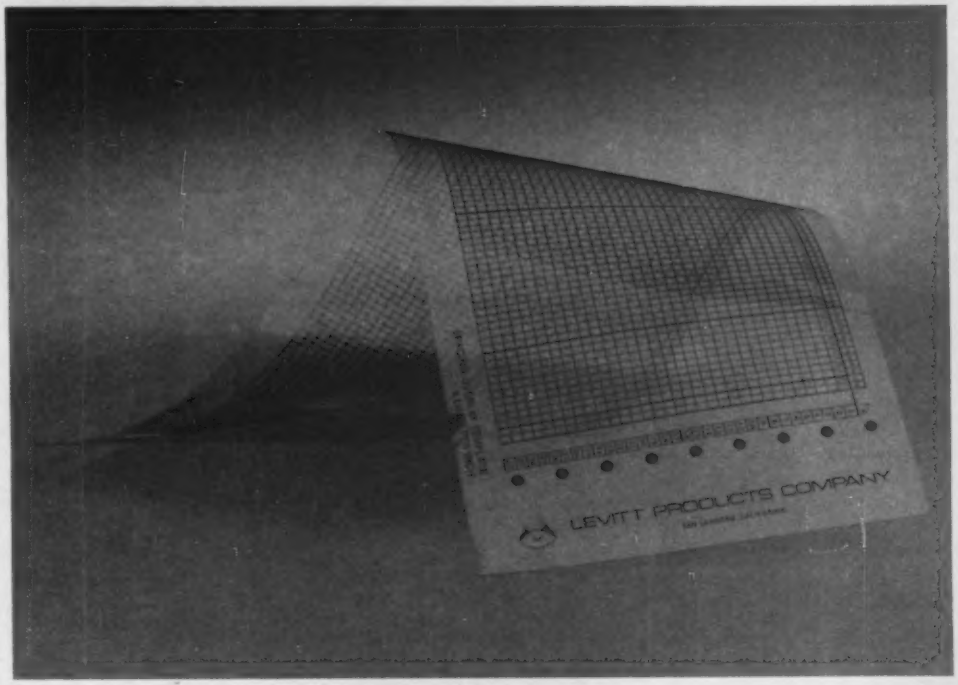
There are some limits as to what has to be disclosed, particularly where no bodily harm is involved, as it rarely is in cases involving computers. Still, recklessness, lying or covering up information is often punished by knocking out a contract. This can often get a computer user free of a five- or seven-year contract that has gone sour.

Cost of Protection

The final item that Connelly really broaches is the matter of the economics of law and computer operations. What does it cost a user to get the courts to keep a computer vendor within the law or to make the vendor pay for any transgressions? How can such costs to the user be minimized?

Again, Connelly went into legal jargon, with references to items like business practices exceptions (an important, seldom-taken, early precaution).

(Continued on Page 68)



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All Templates are available in 10 CPI (Characters Per Inch) by either 8 or 6 LPI (Lines Per Inch) configurations. Prices start at $34 for the large Templates and $21 for the small template. The **Levitt Products Company** offers significant price reductions for quantity orders.

Ordering or additional information may be obtained from Levitt Products Company, P.O. Box 4308, San Leandro, California 94579, (415) 483-2241

Lawyers Advising on Noncontractual Rights

(Continued from Page 67)

At least the importance of this type of precaution is surfacing at last.

The oldest and easiest way to lose legal rights is to assume that the courts have the duty, time and inclination to ferret out the facts and punish the lawbreaker and that the user only has to care about the law, but not the dollars or the mechanics! Anyone who relies on this misconception of our court system will be just as likely to lose his case as win it, no matter how strongly the law is on his side.

U.S. contract law in itself is unable to control current computer marketing practices. Buyers need normal standards of protection for their purchases of computers and should be aware of the noncontractual landscape and associated costs.

However, the real proof of the need for lawyers to start understanding how to handle computer-vendor misconduct comes from history and the track record. During the past decade, I have watched a handful of abused users really fight, while most stand aside and pay up.

But when users have fought, they have collected thousands, hundreds of thousands and even millions of dollars because of such misconduct!

At the same time, I have also watched analyses showing that computer overselling is profitable! And overselling has continued, together with the development of tighter and tighter contracts clearly aimed at permitting behavior that would normally be forbidden in this society.

If users are to have a fighting chance, both the lawyers and the DPers have to understand the situation and talk to each other — in the other's language.

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May I Have an Act of God, Please?

(Continued from Page 63)

by a specified date. And Bobbie began balking. She was perfectly willing to give a best-estimate completion date. But a firm, cross-my-heart-and-hope-to-die completion date was as unrealistic as the original Sched promises, she knew.

Rumley bore in constantly, phrasing the same question in infinitely variable ways. "When will you, without question, be finished with your part of Sched?" And Bobbie, trying to stay calm, responded with her best estimate — and no firm commitment.

"With this change of management, the company is now behind Sched 100%," Rumley began again. Malcolm coughed; it looked like he might dry up and disappear any minute. "We can get whatever resources you need to support your commitment, make it happen. Tell me what resources you need and I'll get them for you."

It was obvious to Bobbie that Rumley meant the traditionals, things like improved turnaround and better keypunch support. But something snapped in her, and her anger boiled out. His confidence, the confidence that he had the power not only to coerce her commitment but to somehow mold the world to fit her new commitment, was pompous and unbearable.

"All right, then, Rumley," she said, her eyes like laser senders boring through the charged room into his, "I'll tell you what. I'll give you my commitment.

"Rumley," she continued, "I'll need an act of God, please."

She turned on her heel, crossed the room quickly, opened the door and left. But out of the corner of her eye she noticed two things. Rumley's fading victory smile was crumbling into defeat. And Malcolm, his hand to his mouth, was barely restraining a laugh which had engulfed his whole face.

Improved System Technologies Inc.

Designing/Documenting User Procedures

Dear Colleague:

The best software in the world is useless if the people who have to make the system work don't know how (because they have not been trained) and/or can't find out (because the documentation is inaccurate and/or incomplete and/or incomprehensible). This is particularly true for terminal users of on-line systems.

IST has developed a new seminar which integrates certain of the structured technologies (data flow diagrams, decision trees, structured English, logically "tight" English) with recent psychological research to create a new and better approach to enabling people to use systems.

First we study ways of designing a system to minimize the need for user documentation and training in the first place. Then we show how to create the best type of documentation for each type of system, and how to test it -- we hold that the personnel subsystem (the procedures carried out by people) should be developed and tested just as carefully as the computer subsystem (the hardware and software). Lastly, we show where documentation fits into a structured methodology and systems analysis and design.

If you are a systems analyst, system designer, on-line programmer or technical writer, we have some valuable new techniques for you.

Public presentations of our three-day seminar, "Design/Documenting User Procedures using Structured Techniques" will be given:

June 24-26	Houston	August 19-21	Baltimore
July 22-24	Chicago	September 9-11	Atlanta

To enroll, or for more information, call John McCann at (212) 586-1098, or return the coupon below.

Sincerely,

Trish Sarson

Trish Sarson
Executive Vice President

888 seventh avenue, new york, n.y. 10019 (212) 586-1098

To: John McCann, Improved System Technologies Inc. 888 Seventh Ave, New York, N.Y. 10019

☐ Send me a detailed outline of your Designing/Documenting User Procedures
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LETTERS

Endorses ACU Efforts

As a regular reader of *Computerworld* I would like to comment on the April 14 article about the Association of Computer Users' (ACU) testing of small computers entitled "Runtimes of IBM 5110 Found Unimpressive." The contents were presented in a simple fashion, and emphasis was given to the fact that benchmarks alone are not the criteria for selecting a system. This I fully endorse.

I would like to encourage more articles of this nature. Even though this job of comparing computers is rather overwhelming and different standards of measurements are used by various organizations, I welcome the approach of the ACU.

Thomas W. Hunt

Cadillac, Mich.

Computerworld welcomes comments from its readers. Letters should be addressed to Editor, *Computerworld*, 375 Cochituate Road, Rt. 30, Framingham, Mass. 01701.

Also Adds Extended Rental Options

Cincom to Hike One-Year License Fees

By Marcy Rosenberg
CW Staff

CINCINNATI — Citing skyrocketing prime rates that have increased the cost of financing software leases, Cincom Systems, Inc. will increase one-year lease license charges an average of 3.8% for systems software products on July 1.

Also effective on that date, the firm will add three- and five-year term rental options which, according to a spokesman, will reduce customers' monthly payments by up to 20% compared with the increased fees under the one-year plan.

With this announcement, Cincom claimed it is the first software house to offer extended, nonequity rental plans.

In addition to short-term lease licenses — in which all usage and support charges are bundled into the monthly fee — Cincom also offers a long-term single-use license payable up-front, which covers all fees except annual usage and support charges after the first year.

Annual Usage Fees

While long-term single-use license fees are unchanged or, in some cases, were lowered from last year's levels for major systems software offerings, annual use and service fees were recently adjusted to 10% of the single-use price for all products.

Setting a uniform 10% charge hiked annual use and service fees for 58% of the vendor's systems software products — for an average increase of 5.3% — while reducing or maintaining the same annual usage fees for the remainder.

Annual usage adjustments take effect on the anniversary dates of individual agreements, according to Wilbur V. Hansen, director of corporate planning and pricing.

Hansen described how the pricing changes will affect new users and existing customers. The cost of a single-use license for the DOS Total data base management system, for instance, remains at $45,000, but the annual usage charge, now at 10%, rose to $4,500 for 1980-1981 from $3,250 in the 1979-1980 period.

And after July 1, lease license customers on a one-year plan will be charged $1,350/mo, up from $1,125. Under the new three-year plan, a lease license will cost $1,285 and, for five years, $1,150.

Similarly, single-use licenses for OS Total still cost $56,500, but annual usage charges jumped to $5,650 compared with $3,650 a year ago. One-year monthly lease prices also increased from $1,400 to $1,695, with three- and five-year lease charges set at $1,610 and $1,440, respectively.

On the other hand, annual usage charges for Honeywell Total, which costs $38,500 for a single-use license, dropped from $7,900 to $3,850

Also falling were single-use license and annual usage fees for DOS and OS versions of Environ/1, Cincom's teleprocessing monitor. DOS Environ/1 now costs $24,500 for a single-use license, compared with $35,000 last year, with annual usage charges dropping from $3,000 to $2,450.

Similarly, Cincom reduced single-use license fees for OS Environ/1 from $42,500 to $34,200 and cut annual usage charges from $3,750 to $3,420.

Monthly Rates

Monthly one-year lease rates for both Environ/1 versions have gone up, however. For the DOS version, licensees on a one-year plan will pay $735/mo, up from $700, while OS users will be charged $1,025 compared with $975/mo last year.

Three- and five-year monthly lease payments for DOS Environ/1 were set at $660 and $590, respectively; comparable fees for the OS version are $925 and $820.

(Continued on Page 72)

From Idea to Profit — Part 4

Approaching Marketers Outlined

By A.L. Frank
Special to CW

Armed with a packaged and priced product, the developer is now ready to approach selected software companies.

The firms he considers, though, should have products that are marketed to a customer base similar to that in mind for the new product.

By determining the product lines of different companies through directories such as Datapro Research Corp.'s, a developer can identify which vendors would logically market his type of product.

The first step in approaching a company is to send a carefully written letter outlining the developer's intent and the product's functions to the executive in charge of product acquisition. The name of the appropriate executive can be obtained simply by calling the company and asking.

If a company does not have an individual directly responsible for product acquisitions, then the developer can address his letter to the firm's president, whose name will probably be included in the software directory describing the company's products.

It is best to approach two to five companies at first to allow the necessary time for the second step — personal follow-up. Initially, this follow-up would just be a phone call to determine if the executive to whom the developer has written has any interest in the product.

Part four of this five-part series on bringing a home-grown software product to market gives advice on how to approach a software company to market your wares. Next week: the pros and cons of various marketing arrangements.

Most organizations will discuss the general nature of the business arrangements in which they engage during the initial contact, but few are foolish enough to volunteer any financial parameters until they have evaluated the product.

Similarly, the developer should also be prepared to volunteer general information and a product description at this point, but should not provide the company with confidential information such as technical documentation or source code.

Evaluation Stage

Once negotiations reach the evaluation stage — when confidential information must be revealed — the developer should obtain a nondisclosure agreement from the organization.

If a company is truly interested in the product, it will probably be willing to send a representative to discuss it further.

However, it is often to the author's advantage to visit the software firm first to determine the nature of the organization and its facilities, as well as to establish a personal relationship.

The author should remember

(Continued on Page 72)

IBM DOS USERS **DOSSIER DOES IT AGAIN**

"DOSSIER has a super ability to detect changed programs—even changes as small as one byte."

"It lets us see what's in the core image library—a great help in program analysis."

"The Called Program Analysis facility is a useful tool for managing relocatable libraries."

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Patrick Elting, Systems Software Senior Analyst, Fort Wayne National Bank

Patrick Elting knows all about program changes. When he began his career in data processing 12 years ago, he was the one who had to keep track of those changes. Now DOSSIER does it for him.

DOSSIER goes beyond source library documentation to translate object code from program libraries into complete and current program and file information. Its 16 management reports address all aspects of controlling and auditing object libraries.

Try DOSSIER free, without obligation, for 30 days. Discover why more than 500 companies are already using DOSSIER to upgrade, maintain and clean up DOS, DOS/VS or DOS/VSE libraries.

For more information, just clip this coupon and mail to Computer Concepts, Inc., 6443 S.W. Beaverton Highway, Portland, OR 97221. Or call 503/297-4741.

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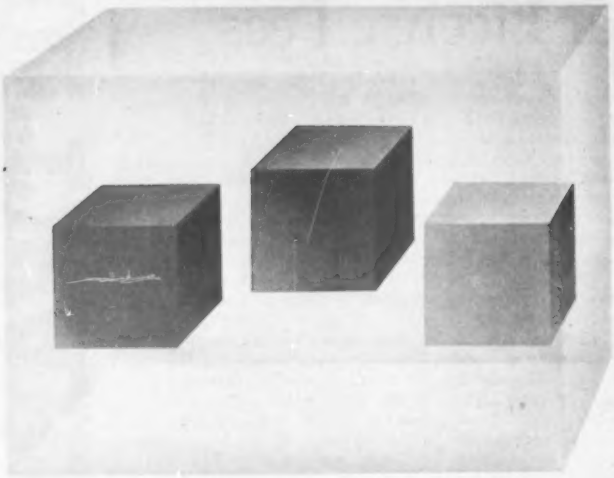

With the recent addition of the Global Console Director (GCD) to Allen Services' line of software packages for Multiple System environments, an entire complex of systems can now be treated almost as though it were one single unified system.

The complete "unified system" effect is achieved through combined use of three independent (but related) program products. Each of these, Super-MSI, MSM and GCD addresses distinct concerns present in multi-system environments.

Of course, since the products are independent, if you aren't yet ready for the full-blown unified system effect, you only need to select the products which interest you.

UNIFIED DATA INTEGRITY (including VSAM)

SUPER-MSI™
The Multiple Systems Integrity Facility™

The Multiple Systems Integrity Facility provides the same thorough dataset integrity protection for jobs in **different** systems that would exist if the jobs were in the **same** system. In addition to propagating "standard" dataset integrity across systems, Super-MSI also insures that the VSAM "internal" SHR options are honored throughout your entire complex. Effective cross-system VSAM integrity can be obtained in no other way than through the use of Super-MSI.

Another feature: Super-MSI also **eliminates the hardware RESERVE lockouts** which are normally inherent with SHARED DASD in multiple system environments.

Much more besides: Super-MSI has many other exciting features including special aids for operators and TSO Users. All in all, Super-MSI will be a very powerful addition to your installation.

UNIFIED DEVICE MANAGEMENT

MSM™
MULTIPLE SYSTEMS MANAGER

The Multiple Systems Manager manages the allocation of TAPE and MOUNTABLE DISK devices across all systems in your complex. It allows you to operate normally with **all** devices **ONLINE** to **all** systems. MSM insures that device allocation by jobs in different systems occurs just as if all jobs were operating in one single unified system.

MSM eliminates the operational burden of juggling TAPE and DISK units among systems. It protects against the danger of a system accidently rewinding or overwriting a TAPE in use on another system; this removes the single greatest cause of shared tape mishaps.

MSM will use your TAPEs and DISKs more efficiently — which can result in immediate device cutbacks or (more likely) postponement of future acquisitions.

MSM is so transparent that it can be operated without the use of any new operational commands. Of course, there **are** powerful new commands available — however these are extras, not necessities.

Only MSM allows such truly NATURAL and transparent shared device management.

Other features (for MVS environments only):

- The MSM Device Preferencing capability allows devices to be dynamically structured into a hierarchy of sets; MSM insures that units in preferred sets are used, wherever possible, before less preferred sets.
- The MSM **SOFTSWAP™** feature insures that DDR device SWAPs for TAPE units will NOT impact JOBs or TSO users which are not using tape allocation. Without SOFTSWAP™, TAPE DDR SWAPS are likely to impede all allocations in a system — including even those which do not use tape.

UNIFIED OPERATOR CONSOLES

GCD™
Global Console Director

The Global Console Director is an extremely flexible tool. It allows (selected) message streams from different systems to be logically "blended" to create a **unified system image** (to whatever degree desired). In a slightly different vein, GCD allows **any** console on any system to be logically attached concurrently (and perhaps in different ways) to any set of systems in your complex!

GCD allows commands entered from any console to be directed and processed anywhere in the complex; in this respect, all consoles are effectively linked to all systems.

In almost every aspect, GCD is philosophically and operationally compatible with the standard system console support.

GCD can improve overall throughput by simplifying operations. By allowing several physical consoles to be logically merged, excess devices can be eliminated for immediate savings, or deployed elsewhere to strategic advantage.

GCD is absolutely transparent to your users, and aside from major simplifications, nearly transparent to operations.

If you wish to use more than one of the above products, they can be integrated together into a single control task (thus further reducing overhead and complexity).

In nearly every instance where our products have been competitively evaluated against all possible hardware or software alternatives — our software has been chosen. Aside from IBM, Allen Services has been providing commercial software specifically designed for multiple system environments longer than any other company. Over 400 major installations throughout the world have already selected our products as the preferable means of handling problems associated with multiple system environments. The number grows daily. **Reliability** has always been an integral part of our design.

When considering software, most people consider **support** to be a very important factor — Allen Services has over 200 support personnel.

The only other comprehensive approach to unifying multiple systems is JES3 (or ASP). Aside from the fact that MSI/MSM/GCD can be installed and implemented in only a few minutes, there are several other significant differences from JES3: For example, MSI/MSM/GCD (combined) use only 1% to 2% overhead; MSI/MSM/GCD are invisible to your users; MSI/MSM/GCD were designed to be strictly compatible with OS/VS/MVS philosophies — in this regard none of your personnel will require re-training.

The majority of all eligible multiple system installations are now using our products to help manage their systems.

Because installations can have widely different characteristics, you may still have a nagging suspicion that our claims may not actually apply to your shop. To alleviate this doubt, we invite you to try our products (whichever ones interest you) at your own installation under your own conditions. This trial carries no charge and is without obligation. One word of caution: You're going to like them so much, you'll never take them out.

ALLEN SERVICES CORPORATION

For more information, call Susan: **800-543-7583** (in Ohio: 513-890-1200)
Or write: Software Department • Allen Services Corp.
212 W. National Rd. • Vandalia, Ohio, 45377

Offers Application Packages

Microdata Debuts at NCC as Software Vendor

By Jeffry Beeler
CW West Coast Bureau

ANAHEIM, Calif. — Microdata Corp., which in the past has confined itself primarily to shipping hardware, soon will begin supplying application software as well.

The software, which was introduced here last week at the National Computer Conference, will be the first set of application packages Microdata has ever sold directly. In the past, the minicomputer manufacturer's users have always developed their application software on their own or obtained it indirectly, either from the vendor's independent dealers or from third-party suppliers like system houses.

Microdata's first offering of application software will consist of nine integrated packages, known collectively as Results. Five of the packages — payroll, accounts payable, accounts receivable, general ledger and financial reporting — will form Results' financial management system.

The other four modules — order/-invoice processing, inventory control, sales analysis and purchase order processing — will constitute the family's distribution system, a Microdata spokesman said.

Users can buy and integrate the nine packages, which are designed modularly, in any combination they wish and later add modules as their business needs dictate, the spokesman explained. To a large extent, they can reportedly custom-tailor the packages to suit their application requirements.

Although Results is intended primarily for Microdata's newest users, the product line is also said to be suitable for the company's long-standing customers, which have already obtained packages from independent sources. If users of the latter category want to add Results modules to their existing application software library, they can reportedly do so with little or no trouble.

During the next few months, Microdata intends to follow its Results family announcement with introductions of additional application-software packages, the spokesman added.

Deliveries of Results' financial management system will begin in June; shipments of its distribution system, two months later. Both will be available only through Microdata's direct sales offices, not through its independent dealerships.

The accounts payable and receivable packages will cost $1,800 each; the financial reporting and sales analysis modules, $1,000 each; the payroll and inventory control packages, $2,500 each; the order/invoice processing module, $3,000; the general ledger unit, $1,500; and the purchasing order processing package, $1,200.

More information about Results is available from Microdata, 17481 Red Hill Ave., Irvine, Calif. 92705.

Geisco Puts DBMS on Mark III

VIENNA, Va. — General Electric Information Services Co. (Geisco) has added a data base management system (DBMS) to its Mark III remote computing services. DMS Level 3 is said to facilitiate information retrieval and improve programmer productivity.

The DBMS consists of two basic components: the DMS language, which is used for English-like updates and queries to the data base, and the Hierarchical Index Sequential Access Method (Hisam), a data storage and access technique that automatically structures data for efficient storage and retrieval, the vendor claimed.

Hisam is, in effect, the data base manager incorporated within the DMS system. It defines and manages the relationship among the various data elements which subsequently are accessed and manipulated through the DMS language.

Features added in Hisam Level 2 include expanded capability of the data base manager to handle data bases up to 1G characters, direct access of dependent records, which improves the efficiency of data retrieval and an increase in the file size from 4,000 to 16,000 pages.

Although Hisam is an integral part of DMS, it is available separately to Fortran programmers requiring its data-handling capabilities.

Value-added conveniences have been incorporated in the DMS Level 3 service which are said to remove a number of tedious programming tasks from the user. New DMS features include:

- Multiple key access, also known as inverted file structure, which provides the capability of specifying, without restriction, the elements within the data base that are to be key fields.
- Multiple reports, now permitted automatically from a single program.
- Report formatting options.
- Multiple hierarchies, now allowed within a single Hisam file.

DMS Level 3 generates Fortran 77 code.

Proprietary products of Geisco, both DMS Level 3 and Hisam Level 2 are upward-compatible with DMS Level 2 and Hisam. DMS Level 3 costs vary depending on the amount of its usage, the vendor said from Suite 510, 8150 Leesburg Pike, Vienna, Va. 22180.

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ABS Updates 'Data Manager I'

COSTA MESA, Calif. — Revision 3 of Data Master I, an interactive parameter-driven data entry/-management system, has been announced by Applied Business Systems (ABS).

Written in Data General Corp.'s Multiuser Extended Basic, the system lets users specify file structures and format the CRT for data entry and editing. Revision 3 allows records entered to be stored temporarily in a transaction file and then posted to a new master file.

The revision's most significant feature, according to ABS, is its ability to generate actual program code based upon the parameters entered.

The system runs on 64K-byte DG Novas or Eclipses under RDOS.

The end-user license fee is $1,750. ABS is at 3303 Harbor Blvd., Building B-6, Costa Mesa, Calif. 92626.

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Steps Outlined in Approaching Software Firms

(Continued from Page 69)

that all software companies do not have the same product needs nor acquisition strategies. Therefore, he should not be discouraged by initial negative responses.

Contract Negotiations

There are two basic types of software marketing arrangements: an outright sale of the product to a company, or a sales agent relationship. The actual arrangement, however, is usually a combination of outright sale and royalty payments.

If the developer is to receive royalties over a period of time that are relative to product sales, he should make suze that the marketing organization agrees to provide a training program for technical personnel, salesmen and users. He should also make sure that the marketing organization is obligated to reimburse him for his assistance in the program.

Working out these details and solving contractual problems are the biggest headaches facing a software developer, according to Ross Allardyce, codeveloper of the Resolve product acquired by Boole & Babbage, Inc. in 1976.

"Software presents some unique problems when you sell the marketing rights and title for some combination of a direct payment and royalties.

"The royalties become especially difficult because they involve future product sales, which in turn are largely determined by how much the software company is willing to invest in promotion, marketing and development.

"These complications make it essential to have a good attorney who knows the software business," he said.

Key Areas

Legal problems can arise in several key areas once the developer reaches the negotiation stage, and he should be aware of them well before reaching that point, Gordon Davidson, an attorney with Fenwick, Stone, Davis and West, remarked.

For example, several questions should be addressed: First, does the developer really have anything to sell and, if so, does anyone else have the rights to it? Second, are the developer's intellectual property rights protected by patent, copyright or trade secrecy laws?

"There is also the possibility that the developer's employer or former employer may have an interest in the work," Davidson said, adding "the purchaser or marketing organization will want assurance that the developer's work is original and not subject to claims by third parties.

"The author may have to shoulder the legal and financial burdens of giving these assurances," he said.

Another area where legal counsel is important is in the choice between selling title to the product or licensing just the marketing rights.

"Revenue from an outright sale of all rights and title may be eligible for capital gains treatment, while royalites are generally taxable as ordinary income. Whether capital gains treatment is available depends largely on how the contract is written," Davidson said.

Product acceptance can also be a delicate issue, he explained, noting "the buyer and seller must agree on legally sufficient definitions of what code, documentation, enhancement plans and product support will be delivered to the buyer and in what time frame.

"The developer's future new product development efforts may become an issue in the contract negotiations.

"Can he develop new products which are similar to the one in question? Will the purchaser or marketing organization have any rights to the new products? These issues need to be legally defined."

Customer Base

Another area requiring clear definition in Davidson's view is whether the developer already has a customer base and who will be responsible for it once the title or marketing rights to the product are transferred.

"Also, if at some point after the contract is signed, the agreement falls through because of unforeseen problems, there must be some provision as to which party will be responsible for the then current customer base," he advised.

The complexity of these and other issues that arise during negotiations makes it imperative that the developer obtain legal and tax counsel.

Frank, an attorney and former director of corporate development at Boole & Babbage, Inc., is a founder and president of newly formed California Software, Inc. in Los Angeles.

Cincom to Raise License Charges

(Continued from Page 69)

Price adjustments will also impact user sites with more than one Cincom product installed, depending on what those products are. Hansen said DOS customers running both Total and Environ/1 software will pay about 2.4% more this year in annual usage fees, which will rise to $12,160 from $11,880 in 1979.

If under a one-year monthly lease license plan, these same customers will pay $3,650 after July 1, up from $3,210. Three- and five-year monthly lease options will cost $3,340 and $3,040, respectively.

Hansen claimed that opting for longer-term leases will benefit users of multiple Cincom products currently under one-year plans. For example, an installation running OS Series 80 Total, Environ/1, T-Ask on-line query and the LMS-II on-line programming software would save $9,780/year by choosing the five-year over the one-year rental plan.

Generally, Series 80 Total customers can reduce their one-year rentals by 5% under a three-year plan and 15% with a five-year option, he said, adding similar cost reductions for Series 80 Environ/1 customers would be 10% and 20%, respectively.

Conversion Option

Customers will be able to convert from one-year to extended rental plans at any time, Hansen noted. Terms of the extended rental plans will also permit Cincom to increase monthly rental prices during the contract period with 60 days' notice.

But by the same token, users will be able to cancel an extended rental contract at any time without penalty as long as they give 60 days' notice.

Over the life of Cincom's systems products, the percentage of customers that lease the software rather than purchase single-use licenses, has increased from about one-quarter to one-third.

Hansen expects these numbers will continue to grow slightly, because an increasing number of systems software products on the market coupled with rapid technological changes in hardware and operating systems may deter user from making long-term commitments.

He emphasized, however, that one-year monthly lease rate hikes were not designed "to swing people to purchase," and that extended lease options were introduced "to reduce customers' monthly lease costs."

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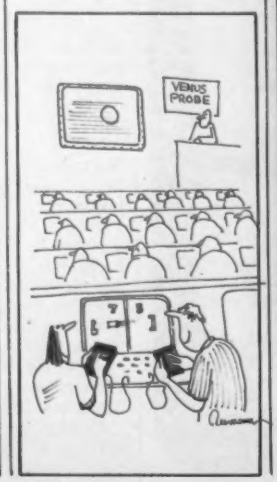

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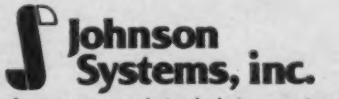

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Johnson Systems is independently owned and operated. For more information, contact Johnson Systems, Inc., 7923 Jones Branch Drive, McLean, Virginia 22102 Telex: 89-9100. For more about APEX, write Mr. Tony Thompson, or call 703 821-1700.

Raxco Offers DRS Enhancements

WEST PALM BEACH, Fla. — Raxco, Inc. recently introduced three enhancements to its Data Retrieval System (DRS) data base management system (DBMS).

The first, XBS, is a higher order language interface for externally programming application modules. Multiple logic reviews of the data file may be activated within a single program through field-addressable subschemata.

A variety of routines are available under XBS for simplified query and update capabilities, the vendor said.

Also added was SIP, a self-contained language that permits definition of transaction displays on CRT terminals. The language allows system development on transaction DBMS.

SIP features include automatic cursor positioning, flexible control of display formats, automatic data validation and procedural error check routines. A hard-copy version of SIP is currently under development.

In addition, RPW, a report writer language, offers branching, looping and conditional and subscripting capabilities.

The three enhancement packages will operate with DRS on Univac. Model 60 CPUs; Digital Equipment Corp. PDP-11/34 superminis and larger systems; and IBM 360, 370, 4300 and 30 processors.

The package will also run on Data General Corp. Eclipse systems, General Automation, Inc. GA 1830 CPUs and Control Data Corp. 6000, 7000 and Cyber series machines.

XBS costs $7,500; SIP, $5,000; and RPW, $5,000 from Raxco at 3336 N. Flager Drive, West Palm Beach, Fla. 33407.

Triangle System Utility Validates Jobstream

SANTA CLARA, Calif. — JCL Check, a system utility software product that validates jobstream JCL before submission to test or production, has been introduced by Triangle Software Co. here.

JCL Check identifies and diagnoses all possible causes of run-time failure and can be executed from a TSO terminal or in batch mode, the vendor claimed.

The product detects errors, such as misspelled names, not diagnosed by the operating system until a job is already in production and also ferrets out errors the operating system may miss completely like "overrides out of order" and "duplicate names," Triangle said.

Four reports are offered with JCL Check. One notes where and why errors occur and the remainder provide complete documentation of a production job stream or system.

JCL Check runs on all OS/VS operating systems and is being offered at an introductory price of $8,500 through Aug. 1. The monthly rental fee is $375 and one-, two- or three-year licenses are available.

More information is available from Triangle Software, 2651 Kentworth Way, Santa Clara, Calif. 95051.

Program Runs Open Items On IBM 5110

PARIS, Tenn. — An open items accounts receivable package that will handle up to 3,800 customers and between 7,500 and 12,000 open transactions is available to IBM 5110 and 5120 users from Data Processing Consultants.

Features of the system include a transaction register, aged trial balance with three levels of detail, selectable aging periods and invoices that remain open until paid.

Providing audit trial listings and entry and editing capabilities for all transactions, the program licenses for $900 from Data Processing Consultants, 304 S. Dunlap, Paris, Tenn. 38242.

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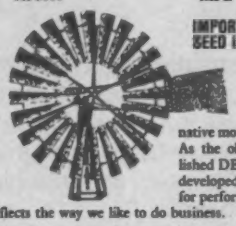

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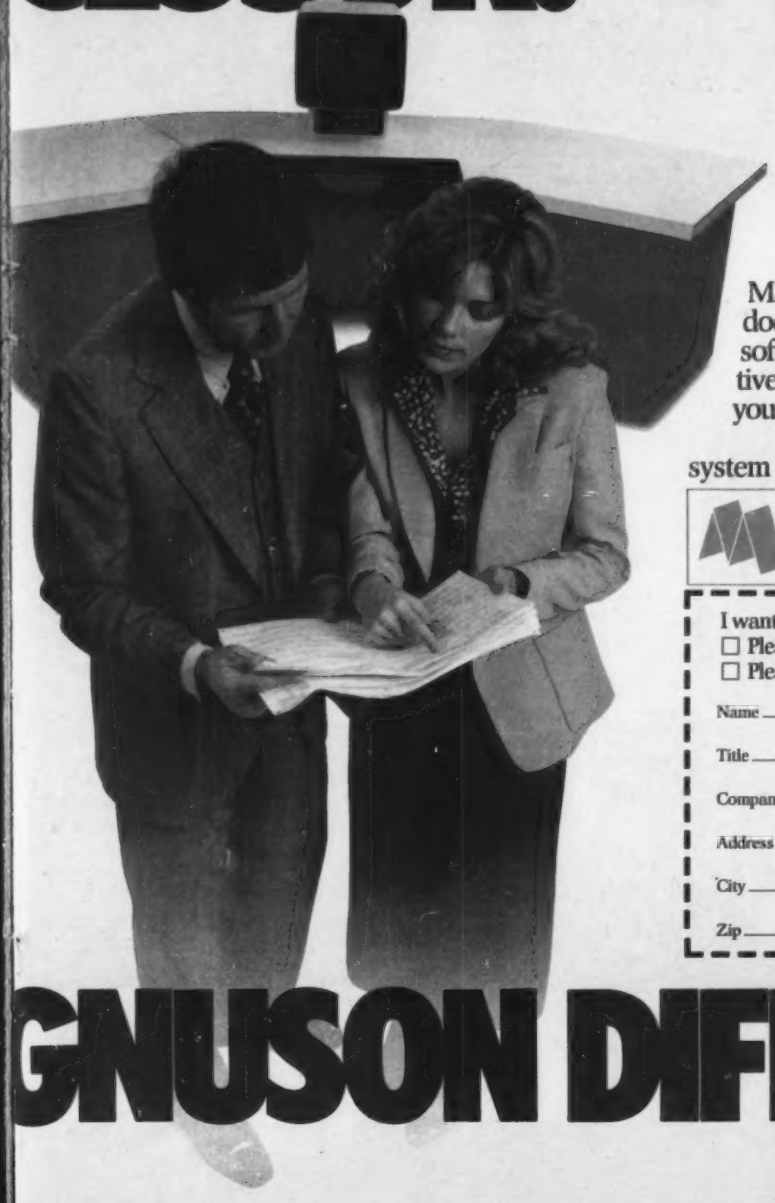

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'SRF' From Gejac

Performance Monitor Fits PDP-11s Under RSX-11M

RIVERDALE, Md. — Geared for users of the Digital Equipment Corp. PDP-11, the System Reporting Facility (SRF) from Gejac, Inc. is said to manage computer performance and capacity in RSX-11M operating system environments.

The performance monitor measures system and peripheral utilization, identifies system bottlenecks and helps users plan for future computer requirements, according to the vendor.

For user and system tasks, SRF automatically logs statistics that show the computer resources consumed by each task. Data collected includes the task name, elapsed time, CPU time, memory size, terminal ID, logon and active UIC, and disk and terminal QIOs.

Global system statistics, such as CPU utilization in the user, executive and idle states, quantify the used and available system capacity, the vendor said.

SRF generates performances and utilization statistics in a series of reports that include an activity log of each task and of periodic CPU utilization. Total system statistics reflect the entire measurement period as well as summaries by account, terminal and task.

SRF operates in a number of RSX-11M environments including real-time, time-sharing, process control, dedicated, general-purpose and single-user and multiuser systems. Included in its $1,995 license fee is a one-year warranty, technical assistance, maintenance support and documentation. Gejac can be reached at P.O. Box 188, Riverdale, Md. 20840.

Credit Industry Gains Support On DG Novas

HICKSVILLE, N.Y. — Targeted for the credit and collection industries, 3CS is an on-line management information system that runs on Data General Corp. Nova computers.

Written in Cobol, the menu-driven software supports from one to 16 interactive CRT terminals and multiple printers, according to its vendor, HDR Systems Associates, Inc.

The main 3CS module contains programs for entering new accounts, applying cash receipts, reporting cash distributions, aged account reporting, printing letters, interactive file inquiry and maintenance and reporting for medical, general consumer and commercial accounts.

Optional Modules

Optional modules are said to allow for account evaluation and performance, custom letter printing, client volume, dollar analysis, volume list, label processing and multistate/municipality payroll.

Prices start at $32,000 for a small-scale, single-CRT terminal system including the main 3CS module, a 100 line/min printer and 32M bytes of disk storage.

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Package Backs MDPS Users

MINNEAPOLIS — An interactive financial accounting system for the Multiple Workstation Direct Processing System (MDPS), NCR Corp.'s multitasking operating system, is available from Open Systems, Inc.

MDPS allows NCR's 8150 small business system to operate with four terminals rather than one and two printers instead of one. Open Systems' MDPS financial accounting system lets the user execute a background task, thus releasing the CRT terminal for data entry tasks while reports are printing.

The MDPS Financial Accounting System provides application programs that can run either standalone or with automatic interfacing. They include accounts receivable with billing and sales analysis, accounts payable, sales order processing, payroll, inventory, general ledger and job costing.

NCR 8150 users can upgrade to MDPS by purchasing additional memory and a processor board modification. Users of Open Systems' software on NCR's 8130 and 8150 CPUs can upgrade their financial accounting system software to MDPS and still be compatible with current data bases.

The MDPS Financial Accounting System costs $800 on the NCR 8100 series and $1,000 on the NCR 8200 series, Open Systems said from 430 Oak Grove, Minneapolis, Minn. 55403.

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Instead of Making Charts

Bank's Graphics Package Lets Analysts Analyze

CHICAGO – After a year and a half of diverting the energies of its cash management consultants and analysts into drawing graphs, the Cash Management Systems Unit of the First National Bank of Chicago decided to automate the procedure by using a computer graphics software system.

It did not have to go far to find one. Some divisions within the bank were already using Disspla – from Integrated Software Systems Corp. (Issco) – to draw charts and graphs for internal analyses and reports to management.

Cash Management was drawing manual graphs to support its internally generated Focus reports, which perform funds collection analyses for customers, according to James C. Cupec, manager of the unit. Focus is a proprietary cash management tool the bank developed to analyze patterns that show where firms are getting and sending funds and on which banks they are drawing. Its purpose is to determine what kind of system can be produced to eliminate float, or funds in the process of collection.

Illustrations are often effective in presenting such analyses to customers. "One of the primary areas where we illustrate with Disspla is lockbox analysis," Cupec said, describing a system in which a company's customers send their payments to a post office box rather than to the company's normal street address.

The post office boxes are separate from the company's mailing address because of the high volume of bill payments. The company's bank is also given access to the post office boxes that cuts float even lower, Cupec claimed, because the boxes can be placed in cities where customers live.

"We can use color or shaded bar charts to draw a cost comparison between a lone-lockbox system vs. a two- or three-lockbox system," he explained.

Before choosing Disspla, the First also considered Tektronix, Inc.'s Plot-10, which was rejected not for deficiencies, but because of Disspla's added flexibility, the manager said. That flexibility included a wider selection of print fonts, the ability to create shaded bars and Issoc's willingness to support its package, he explained.

Problem-Free Installation

Installation was problem-free. There have been no serious operations problems since, although some minor problems have popped up and been dealt with summarily by the vendor, Cupec said.

In one case, a typeface was discovered to have some flawed characters. In another, the bank required increased support for one of its plotters. In the first instance, a replacement font was sent out, and in the second, Issco altered the plotter to advance and cut paper automatically.

The plotter in question was one of many Hewlett-Packard Co. and Tektronix plotters running off Disspla and the bank's 3M-byte IBM 370/158. The bank will be phasing out the Tektronix printers in favor of more HP systems because the latter use a four-color pen. The Tektronix models employ only two colors, Cupec said.

In order to make Disspla more accessible to cash management employees with little or no computer background, the bank took about three months to write a front-end program that allows them to draw some line and bar charts using English-like commands instead of computer language, according to Cupec.

Other programs for specific applications have been written in as little time as two days and have been used for specific financial decisions where charts were needed to see how expenses built up over time, Cupec said.

"A publication-quality plot can be completed in minutes, rather than hours or days, and the flexibility of the system enables us to try different types of formats before choosing the one best suited to represent the statistical information," he said.

Those alternate formats include pie charts, bar charts and vertical and horizontal bar and line graphs.

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The Plus 80 offers everything IBM has to offer and a few extras. Like a switch that allows the program pad to act as a 10-key adding machine. Internally stored diagnostics are built in for both user and Trivex Field Service fault isolation.

Diagnostic routines have been greatly simplified for the operator. The unit is designed to test the functions of the display at power-up, before automatically switching to on-line mode.

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Survey by VDC Finds

Users Favor 80-Column CRT Displays

By Bruce Hoard
CW Staff

WELLESLEY, Mass. — Eighty-six percent of alphanumeric CRT terminal users favor 80-column by 24-row displays, and terminals with those characteristics will continue to dominate the marketplace for at least the next five years, according to a recent survey by Venture Development Corp. (VDC).

The survey also found that "smart," editing CRTS are the most popular among users.

The 80-column display has become standardized to the point where only 5% of the users surveyed prefer displays with fewer than 80 columns and 9% prefer more than 80.

Although IBM, Digital Equipment Corp., Datamedia Corp., Datagraphix, Inc. and others offer CRT terminals with 132-column displays, the popularity of their offerings has not lived up to expectations, the study reported. Nevertheless, VDC predicted other vendors will soon manufacture the expanded displays.

"One of the advantages of a 132-column format is its ability to approximate the size of a printer so data can be displayed as it is printed," a VDC spokesman said. "The extended screen is also useful for coding, debugging and maintaining software."

On the negative side, electron beams must travel further from one side of a 132-column screen to another, leaving the door open for more distortion, he noted.

Other problems he mentioned included the added expense of higher quality monitors and the need for larger power supplies.

Dedicated applications such as data entry, inquiry/response and order entry do not require 132-column displays and users just are not willing to pay extra money to obtain a feature they feel has only marginal value, the study suggested.

More Characters Sought

Users did express a desire for more characters per display, however, but indicated they should come through additional rows and not columns. The increasingly common integration of word processing and conventional DP is the driving force behind that attitude, the study surmised.

A 25th row is becoming more widely accepted. It is used primarily for monitoring system status and control rather than displaying data, according to the survey report, "Alphanumeric CRT Terminals: A Strategic

(Continued on Page 82)

MDS Unveils 'Office of Present'

By Brad Schultz
CW Staff

DETROIT — The "office of the present" — not the future — is the target of an integrated DP, word processing (WP), electronic mail and network management service unveiled at the recent International Communications Association (ICA) convention here.

The Worldwide Integrated Communications (Winc) service from Mohawk Data Sciences Corp. (MDS) allows an organization to give intelligent terminals in its domestic and international facilities both data- and text-oriented functions, a spokesman said.

The typical user would be a large company with more than $200 million in annual revenues and at least 10 branches.

Many users are not ready for so-called "office of the future" products, which require extensive equipment acquisitions and readjustments of personnel, the spokesman observed. But MDS thinks many organizations are demanding something like Winc right now — a service based on the vendor's Series 21 terminal family and an electronic mail service (EMS) that Wiltek, Inc. of Norwalk, Conn., has sold for seven years.

Winc ties to the TWX and Telex public networks as well as to the U.S. Postal Service, but is meant to replace those media at less cost, the MDS spokesman said.

CW At ICA

Typically, Winc traffic will be time-critical, requiring delivery in a time frame ranging from 15 minutes to overnight, he added. A Winc message unit (600 characters) will usually cost less than a postage stamp to deliver, according to MDS estimates, and be routed to or from user work stations at 1,200 bit/sec.

The communications service "is geared to large companies that presently have a leased-line teletypewriter-based network or are heavy-volume TWX or Telex users."

Besides the Series 21 intelligent terminals, which can support a wide range of DP, text-oriented and network management tasks, MDS models 300 and 400 message terminals and the vendor's Plus-70 and Plus-80 editing terminals are adequate for Winc applications limited to correspondence and document generation, the spokesman indicated.

(Continued on Page 82)

Tyme-Gram Makes Formal Bow

By Phil Hirsch
CW Washington Bureau

DETROIT — Tyme-Gram, a low-cost electronic mail service (EMS), was officially unveiled by Tymnet, Inc. at the International Communications Association's recent annual conference here.

Tyme-Gram service will begin Sept. 1 and encompass 30 cities, Tymnet said. Rates will range from a low of 30 cents for next-day delivery of a one-page, 1,500-character message to a high of $1 for such a message under the proposed tariff.

Western Union Telegraph Co.'s comparable charge for Mailgram service, according to Tymnet, is $1.92.

Startup of the Tymnet EMS on Sept. 1 is dependent on approval of the tariff by the Federal Communications Commission. That approval could be delayed by objections from numerous competitors. Besides Western Union, the competition includes GTE Telenet Communications Corp. which, like Tymnet, operates a nationwide public packet-switched network. The Telenet offering, also recently announced,

(Continued on Page 84)

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MDS Unites DP, WP, EMS, Net Services

(Continued from Page 81)

In EMS mode, Winc lets users communicate outside their network through TWX, Telex, Western Union Telegraph Co.'s Mailgram and international common carriers such as ITT World Communications, Inc., RCA Global Communications, Inc. and Xerox Corp.'s Western Union International.

The service automatically polls each terminal in the network, collecting messages or data to be delivered to other terminals. The user can select the polling interval, so locations with heavy traffic demands can be polled every 15 or 30 minutes, the spokesman said. Other sites might be polled at intervals ranging from hourly to twice daily.

Wiltek's Norwalk headquarters oversees Winc operations. There, multiple computer systems poll individual terminals over phone lines, store and route messages and data and monitor the network's performance, the spokesman explained. MDS bought all rights to Wiltek's products and services earlier this year.

Data entry will be a major distributed processing application of Winc. At field locations, a user's inventory records, payroll information and customer orders can be entered, edited, formatted and verified on Series 21 terminals. While the terminal awaits polling, the information can be stored in its internal floppy disk unit.

According to the spokesman, the Wiltek computers in Norwalk convert messages and data to the formats and protocols supporting their destination. The Series 21s adhere to IBM 2780 bi-synchronous protocol, another spokesman stated.

"Any [EMS] should duplicate, step by step, the procedure of sending a letter through the U.S. mail," the first spokesman declared. "That means it should have the ability to write the correspondence and check it for errors, provide an 'envelope' to put it in, stamp it, supply a 'mailbox,' collect the mail at scheduled times, take it to a 'post office' where the stamp is canceled and deliver it promptly."

Winc reportedly does just that. The Series 21's WP capability can generate and edit the correspondence, he maintained. The MDS service supplies mnemonic addresses — such as "NYC" for New York City — and the floppies within the Series 21s serve as "mailboxes."

Message charges are 15 cents per message unit for express service, which delivers a message to a location as soon as that location is polled, and 6 cents per message unit for overnight service. Those rates decrease to 10 cents and 4 cents, respectively, for "high-volume" users, the spokesman said.

Winc vs. TWX

MDS released a cost comparison between Winc service and TWX service for a network with 50 nodes, each sending 20 messages daily and having an average of two destinations per message.

On that basis, Winc would cost $22,758/mo and TWX would cost $26,800/mo, MDS claimed.

MDS is headquartered at 1599 Littleton Road, Parsippany, N.J. 07054.

Users Say They Prefer 80-Column CRTs

(Continued from Page 81)

Analysis."

The report broke the installed base of alphanumeric CRT terminals down to three categories and said IBM has a 23% overall share of them.

The first category is conversational, or "dumb," CRT terminals, which VDC explained were originally designed to replace the teletypewriter. They comprised 23% of the 1978 installed base.

Dumb terminals are not programmable, contain no storage buffer, cannot insert lines of copy and communicate with a computer one character at a time.

Editing — "smart" — CRT terminals are the second and most prominent category mentioned in the report. They were broken into two subdivisions: IBM 3270 and compatible and non-3270-compatible. Of the installed base, 31% fell under the former category while 26% were non-3270-compatible.

Distinguishing characteristics of this category include read-only memory (ROM) and programmable ROM; however, the report said, these smart terminals are not user-programmable. They can store data, send it to a computer and insert characters or lines without computer assistance.

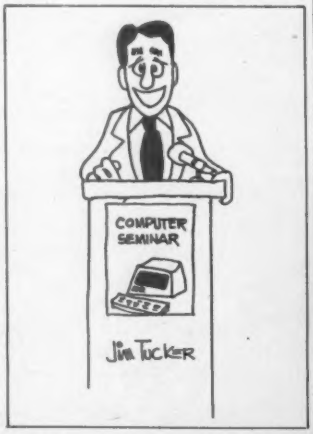
The third category mentioned by the report was processing CRTs. Although connected to a larger computer, they are capable of performing several stand-alone tasks.

Two subdivisions were also broken out here: single-station (6% of the installed base) and clustered processing (15%).

These terminals are user-programmable, process data locally through random-access memory and high-level languages and can drive peripheral devices such as printers and floppy disks.

VDC predicted the installed base of alphanumeric CRT terminals will grow at a compound rate of 21.6% over the next five years, resulting in 4.5 million units being installed by the end of 1984. At the end of last year, 1.7 million were in place, the consulting firm noted.

Initial copies of the study cost $1,495 and additional copies sell for $149.50. VDC is at 1 Washington St., Wellesley, Mass. 02181.



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If They Conform, So Will IBM

IBM's X.25 Adoption Seen Hinging on Carriers

By Brad Schultz
CW Staff

DETROIT — Domestic carriers must conform to the proposed X.21 and X.25 international standards before IBM will allow its users in this country to adapt terminals to conform with those recommendations of the Consultative Committee on International Telephone and Telegraph (CCITT).

While data communications managers from many large U.S. firms met here recently at the International Communications Association (ICA) Conference and discussed their need for internationally acceptable facilities, spokesmen for IBM hinted that X.21 and X.25 must win AT&T's approval before the largest DP vendor gives the protocols to domestic customers.

IBM support of X.25 was hinted at by Dr. Louis M. Branscomb, IBM vice-president and chief scientist, at the ICA conference. "It is IBM's objective to provide the capability of attaching selected products to public data networks with [the] X.25 . . . interface," Branscomb said during a speech on "Computer Technology in the '80s" [CW, May 19].

IBM users in the U.S. have looked to the giant vendor for signs that it endorses the proposed CCITT standards for terminal-to-network links, which already apply to most data traffic in several foreign nations. Last December, IBM told Japanese users they would soon have X.21-based services through certain Systems Network Architecture (SNA) products that interface with Nippon Telegraph and Telephone networks.

IBM has also released products that adapt users in Canada, West Germany, France and The Netherlands to X.25.

According to a written "statement of direction," the vendor "encourages the use of international standards as the basis for interfaces to public data networks providing circuit-switched, packet-switched and leased-circuit services."

IBM customers deserve X.21 and X.25 ties because the protocols "provide users with new alternatives for transmission that supplement the functions provided by [SNA]," the statement read.

No Word From Branscomb

But Branscomb balked at a chance after his speech to flatly predict that U.S. customers will get the compatibility. Much depends on the course taken by AT&T, he told the press.

IBM feels it must stay compatible with Bell network facilities, the former National Bureau of Standards director explained.

The recent Federal Communications Commission decision to deregulate Bell's purely DP operations was welcomed at IBM headquarters, Branscomb observed.

The commission's flirtation with regulating the DP marketplace worried IBM management, he said, although the objective was to keep Bell from capsizing smaller data communications suppliers as the company plunged into the marketplace they serve.

Tyme-Gram Makes Formal Bow

(Continued from Page 81)
is called Telemail.

The rate for each Tyme-Gram will be distance-insensitive, varying according to the number of messages the customer sends each month. A message is defined as one page containing a maximum of 1,500 characters. For the first 2,500 messages, the charge is $1 per message. For the next 5,000, the rate is 75 cents each.

It drops to 50 cents for each of the next 7,500 messages, to 37 cents for each of the succeeding 35,000 and to 30 cents for each additional message after that.

The cities to be included in the initial Tyme-Gram service are the 30 largest in the nation. They include Charlotte, N.C., Tampa, Fla., Portland, Ore., and Phoenix.

Route of Messages

Tyme-Gram messages can be input through a wide variety of dumb and intelligent terminals ranging from teletypewriters to computers and including on-line mass storage devices such as magnetic tape and disk units. The messages are transmitted in binary form to a Tymnet computer which arranges them in Zip Code order, then dispatches them to each distant city.

There, high-speed equipment converts the messages to hard copy, folds each one and places it in a distinctive envelope. The messages are then taken to the local central post office by a specified time each day and are delivered to the recipients the next day by U.S. Postal Service letter carriers.

Test Results

In some destination cities, Tymnet will use its own facilities and personnel to process Tyme-Gram and deliver them to the post office: in others, the company plans to contract this job out to commercial *mailers.*

Although next-day delivery is not guaranteed, Tymnet President Bob Harcharik reported that a preliminary test of Tyme-Gram in San Francisco and Los Angeles "shows that we can achieve next-day delivery in over 90% of the cases."

Among the companies participating in the test was Shell Oil Co., which played a leading role in persuading the U.S. Postal Service to develop Electronic Computer-Originated *Mail (Ecom), a service similar* to Tyme-Gram.

Ecom, however, has been delayed and possibly aborted by opposition from commercial EMS vendors and others.

According to Harcharik, Tyme-Gram's lower-than-Mailgram rates will make Tymnet's service cost-effective for many new applications. He mentioned sales canvassing and fund-raising as examples.

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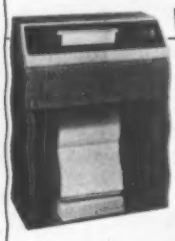

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Geller Sees 'Good Chance' Rewrite of 1934 Law Will Happen by End of '80

By Phil Hirsch
CW Washington Bureau

DETROIT — There is "a good chance" Congress will enact new national telecommunications policy legislation this year.

That is the opinion of the President's chief telecommunications adviser, Henry Geller, who heads the National Telecommunications and Information Administration. Geller was a featured speaker here last week at the annual conference of the International Communications Association (ICA), a

CW At ICA

users group composed primarily of communications managers employed by the nation's largest companies.

Geller was even more specific when he met with the press after his address. He said the chances "are about 55%" that Congress will deliver a revised version of the 1934 Communications Act to the President by the end of this year. "And if it doesn't happen this year," he added, "the chances of doing so next year are even better."

Not everyone agreed. Westinghouse Electric Co.'s Robert E. Bennis — who heads an ICA committee that has been playing an active role in the legislative drafting process for the past two years — said he thought Geller was being optimistic.

But AT&T Board Chairman Charles Brown, who gave the ICA keynote address, said he was "encouraged" by recent developments on Capitol Hill. He specifically mentioned a proposed amendment to H.R. 6121, the House of Representatives' version of the Comminications Act rewrite bill offered late last month by Rep. James Broyhill (D-N.C.). Broyhill has generally reflected AT&T's views in the policy debate.

The Broyhill amendment is considered to be a breakthrough by at least some observers because it gives AT&T's competitors — particularly those within the computer industry — a concession they have been demanding ever since the policy debate began four years ago. Specifically, the Broyhill amendment would require AT&T to transfer the manufacture of intelligent on-line terminals to a subsidiary that would be fully separated from Western Electric. That subsidiary, rather than Bell Labs or Western Electric, would have to conduct all research and development related to competitive services.

Neither of these changes could occur until at least six years after enactment of the legislation — one of several qualifications that bother many of Bell's competitors.

But, Geller said in an interview following his ICA speech, despite this concern there has been substantial progress within the House subcommittee in developing legislative language to implement the Broyhill proposal.

When this effort started about May 1, there were "15 issues to be resolved," he reported. At the beginning of last week, "all but four of them had been settled."

'Lawyers' Paradise'

In his speech, Geller pointed to a growing realization that further delay in modernizing the Communications Act of 1934 will create a "lawyers' paradise" in which the courts wrestle endlessly with the underlying issues. Telecommunications technology is changing too rapidly to permit such delay, he said.

Robert Bennis, who spoke shortly after Geller, reflected this same thought when speaking about the need to "unleash the full range of [telecommunications] technology now, rather than after a court decision" so users can exploit the benefits.

Geller pointed out that even if acceptable language embodying Broyhill's proposal is drafted, H.R. 6121 would still face several challenges before it could be enacted.

But, he contended, if the amendment is accepted by three key members of the House Communications Subcommittee — Tim Wirth (D-Colo.), Broyhill and Chairman Lionel Van Deerlin (D-Calif.) — the subcommittee will report the bill to its parent, the House Commerce Committee.

Once this happens, he claimed, the committee will approve it "quickly", as will the full membership of the House.

Geller also predicted that the Senate, which has drafted two versions of legislation to replace the '34 Communications Act without having reported out either, will "move into high gear" as soon as the House Subcommittee acts. Although the Senate and House versions of the rewrite differ in key respects, he does not believe this will be a problem once the legislation starts moving.

Xerox Enhances 1350 Terminal

LOS ANGELES — Multiple terminal and communications capabilities have been added to Xerox Computer Services' Model 1350 intelligent terminal.

Users can now connect up to four additional terminal workstations to the 1350, selecting a combination of CRT and hard-copy equipment to meet their requirements, according to the company, part of Xerox Corp.

A typical 1350 system consists of a CRT keyboard terminal, a 200 char./sec matrix printer and a microprocessor control unit with four floppy disk drives for information storage. By adding communications capability to the package, users will be able to perform several functions simultaneously, including sending and receiving data, Xerox said.

Purchase price of the 1350 is $15,000, with software costs of $135/mo. Prices for multiple terminal systems vary depending on configuration and user applications, the vendor said from 5310 Beethoven St., Los Angeles, Calif. 90066.

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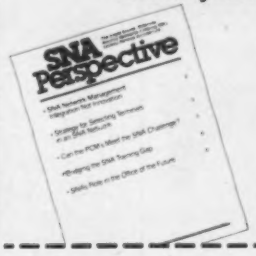

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Microwave, Too, NTIA Chief Says

Geller Sees Cable TV Replacing Local Loops

By Phil Hirsch
CW Washington Bureau

DETROIT — The use of cable TV and microwave in place of local-loop circuits provided by the telephone company will become widespread in the 1980s, Presidential telecommunications adviser Henry Geller predicted here recently in a speech to the annual conference of the International Communications Association (ICA).

About 20% of all U.S. households are now accessible via cable; by the end of this decade, the percentage will be at least 33% and possibly as much as 50%, Geller said.

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Meanwhile, systems with greatly increased transmission capacity are under development. Geller, chief of the National Telecommunications and Information Administration (NTIA), reported that in Atlanta and Pittsburgh, Pa., plans for 80- to 85-channel networks have been announced. In New York City, a system providing more than 100 channels is planned.

Typical cable TV systems presently in use have 20 to 30 channels.

Xerox, which last year announced plans to offer an electronic mail service called the Xerox Telecommunications Network (Xten) supported by satellite or terrestrial broadband intercity transmission channels linked to the user's premises by microwave local distribution circuits, is one of a number of supplies already planning to use these new facilities. Videotex and teletext services — which utilize home TV sets to deliver a wide variety of information on-line to homes and offices — represent another application.

Preventing Exodus

The federal government probably will have to limit the number of new local-loop offerings "for some time" to prevent a mass exodus of subscribers from telephone company-provided facilities and a resulting increase in rates for local telephone service, Geller said. Among the other problems posed by the convergence of TV and data transmission technologies is whether to regulate cable TV system operators and how to interface their networks with the telephone network.

NTIA is currently working in both of these areas, Geller said.

The Carter Administration is also trying to curb government competition with commercial vendors of on-line services, he added. It has tried to persuade the governors of the U.S. Postal Service that the post office's proposed Electronic Computer Originated Mail (Ecom) should be scaled back so carriers transmit messages and the Postal Service performs message-conversion and delivery functions; but the governors have not yet decided whether to accept this advice.

Meanwhile, the Federal Reserve Board has established a network of automated clearing houses for the nation's banks, thus providing a service which competes with commercial offerings. A Presidential task force is now "looking at this problem," Geller said.

He noted that the Carter Administration agrees with a recent recommendation to Congress from the Federal Communications Commission (FCC) which endorses the idea of letting Communications Satellite Corp. (Comsat) serve end users directly instead of through leasing its international satellite circuits to other carriers. But Geller said any such change should assure that other carriers providing end-to-end international services will have access on nondiscriminatory terms to Comsat transmission facilities.

Growing Concern

Within the next six months, Geller expects the Organization for Economic Cooperation and Development, representing all of the major industrialized nations of the world, to approve privacy guidelines that largely follow U.S. recommendations rather than the more restrictive rules proposed by European countries. But on a related front, Geller indicated growing concern.

Other countries are continuing their efforts to shift data communications users from leased private-line circuits which allow full utilization of the related transmission capacity to "volume-sensitive" tariffs covering facilities priced on the basis of usage.

In each case, Geller said, the effect if not the intent is to erect a nontariff trade barrier designed to protect a country's suppliers of domestic information services against foreign — generally U.S. — competition.

Japanese Curbs

Japanese restrictions on the use of their private-line circuits by U.S. time-sharing companies represent one example of this problem, Geller indicated. The restrictions require each circuit to terminate at a single specified computer in the U.S.

Since the affected U.S. companies — Tymshare, Inc. and Control Data Corp., among others — distribute their application programs and data bases among a number of locations, the result is a sharp reduction in the remote computing services they can market in Japan.

Alternatively, the Japanese — together with U.S. international record carriers — have begun offering international "data base access" circuits priced at volume-sensitive rates, which are free of termination restrictions. These offerings were recently authorized by the FCC despite strong protests from U.S. time-sharing companies, whose basic objection is that the new facilities, besides costing more than present full-period leased circuits, also are less efficient because they cannot be modified to accommodate proprietory protocols and other types of customizing.

Brown Sees Technology Solving Economic Ills

By Brad Schultz
CW Staff

DETROIT — Computer technology may bail the nation out of its economic quagmire, Charles L. Brown, AT&T's board chairman, told the International Communications Association (ICA) here last week.

That is how Bell overcame a productivity slump of its own about 10 years ago. Administrative software systems gave the giant telecommunications supplier tighter controls over its diverse operations and reduced the number of Bell employees needed to serve each 10,000 telephones from about 80 in the years 1968 through 1970 to 60 employees in 1980, Brown said in the ICA convention's keynote address.

Bell now runs more than 300 administrative systems to aid the design of switching centers and configure the cables and trunk lines that interconnect them. Such systems "have an enormous potential for improving productivity in a great many businesses," Brown said.

The nation's companies will be increasingly dependent on telecommunications networks in the years ahead and, therefore, will be more productive as computer technology raises the efficiency of those networks, he predicted.

'Next Age of Discovery'

"We meet in an uncommonly cheerless time so far as the economy is concerned," the AT&T chief told ICA. But the convergence of computer and communications technologies may usher in the world's "next age of discovery."

It may also usher in Bell's next age of rapid fiscal growth. The firm has taken "dead aim" at the "information market," Brown declared, and gained confidence from the Federal Communications Commission's (FCC) recent final ruling in Computer Inquiry II — an examination of whether Bell should be allowed unregulated entry into the DP marketplace.

The FCC decided to relinquish jurisdiction over the purely DP-oriented offerings of Bell and other communications vendors starting to address computer users. However, Bell continues to face a major antitrust action lodged by the U.S. Justice Department as well as proposed revisions of the 1934 Communications Act.

Both the judicial and legislative actions turn on charges that Bell gives its DP operations unfair advantage over many independent DP vendors because Bell's DP operations allegedly get a large share of revenues from the holding company's massive telephone business.

After more than two decades of debate, the fundamental issue is not whether competition

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or regulation should govern telecommunications, Brown stated. Instead, Congress should designate "once and for all" those areas of the industry that warrant regulation and those in which competition is appropriate.

New legislation is especially desirable because the FCC's authority to sanction direct competition between AT&T and DP vendors may be vigorously challenged in the courts, according to Brown. However, the "information age" is an inevitable result of technological progress that cannot be managed by regulatory fiat, he said.

Bell plans to accelerate its implementation of digital technology in the public switched network, working toward all-digital links among residences as well as businesses. To improve customer responsiveness, Bell is phasing in a Customer-Oriented Measurement System, Brown continued.

The system involves applying the user's response to a four-page questionnaire to Bell's analysis of the user's needs.

In an interview after the speech, Brown said the nation's current economic recession has hurt some areas of the telecommunications industry. On the other hand, it may be prompting some users to upgrade certain resources because of urgent demands for productivity enhancement.

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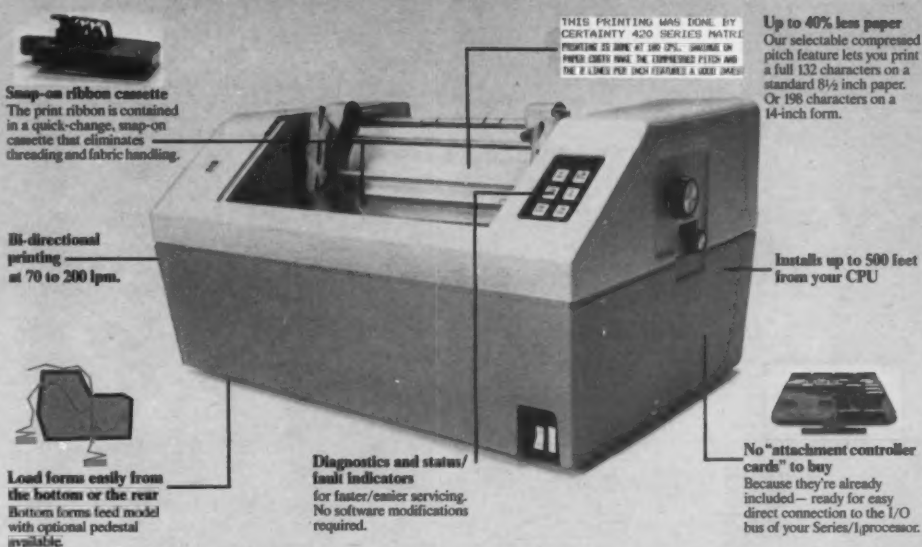

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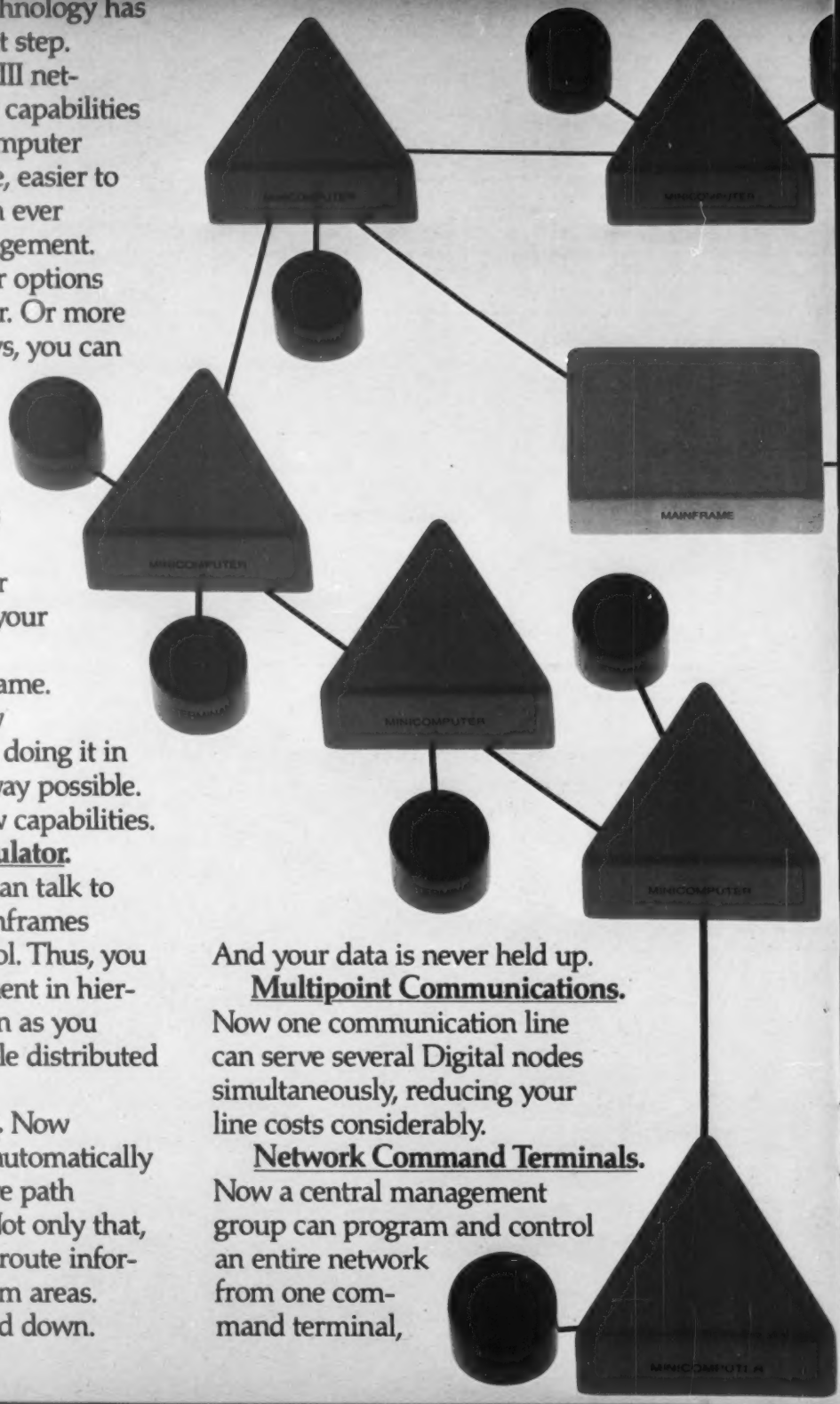

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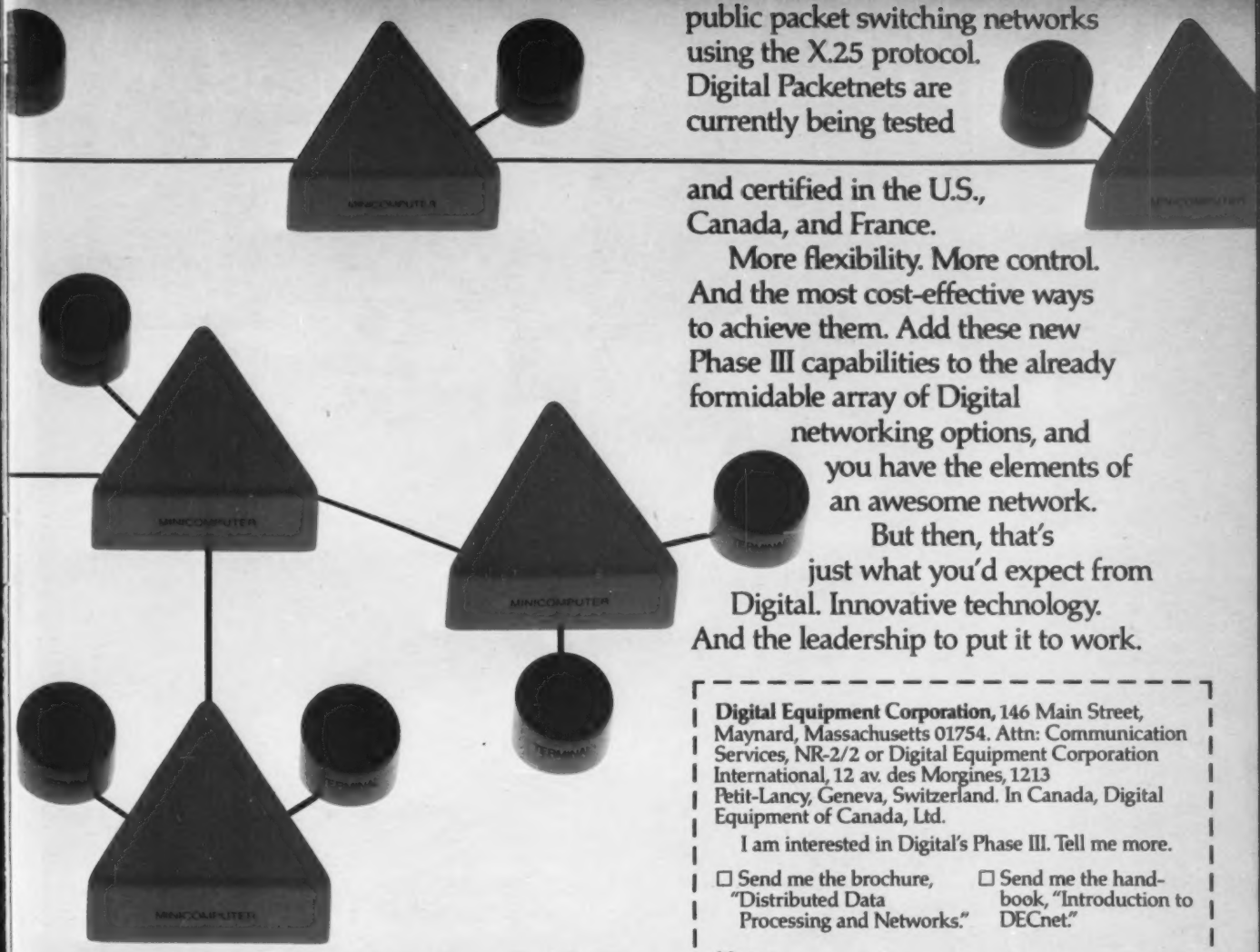

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Publishes Monthly Tabloid

Alternate Burroughs User Group Forms

By Marguerite Zientara
CW Staff

AUSTIN, Texas — An independent, profit-oriented Burroughs Corp. user group was started here last December in an attempt to offset Burroughs' traditional "no advertising, no publicity" policy that allegedly resulted in "frustrated" users who lacked needed information.

Established by several Burroughs users who still work for other companies, BWI, Inc. maintains a full-time staff of seven people, all of whom have "some Burroughs experience and are aware of the issues faced by Burroughs users," BWI Vice-President Tom Clark explained.

With a stated objective of establishing a regular communication vehicle among Burroughs computer sites, BWI publishes a 24-page (and growing) tabloid called *BWI Monthly*, the advertising in which "pays a lot of the bills," Clark said.

The 2,000-member association is basically "pro-Burroughs," Clark explained, but will use its publication as a forum to air both positive and negative issues of interest to users. "We're not going to whitewash issues in the publication just to make Burroughs look good, but we all have a lot of money invested in Burroughs computers and it's in our best interest to maintain a positive relationship with Burroughs."

While BWI is not affiliated with or sanctioned by Burroughs Corp., Burroughs does sponsor its own user group. "They meet twice a year, and actually a small percentage of Burroughs users attend those meetings," Clark claimed.

"What we're offering that we think is a little different and attractive to the Burroughs users is a monthly publication dealing strictly with Burroughs-oriented issues, so people can get news about Burroughs often without having to go to those semiannual meetings."

BWI will not be having large national meetings, however. Instead, the group will help smaller, local groups establish themselves. "In areas where there are not local groups, one of the things we're trying to do is to help those local users get organized and tell them such things as how to conduct meetings and how often," Clark said.

Burroughs' Stance

While Burroughs now looks on the group "favorably" and thinks it's "a good idea," according to a Burroughs spokesman, its initial reaction to the concept was a bit more guarded, BWI's primary organizer, James C. Boon of Boon-Chapman Insurance Managers, said here.

"Burroughs management tried to discourage us by telling about similar efforts that had failed in the past because users were too apathetic to participate," Boon recalled, adding, "I can understand that, because those previous attempts were done using voluntary help.

"I think our members will appreciate that we are running this association like a business," he suggested. "The stronger we are financially, the more beneficial our services will be."

Besides the monthly journal, those services include a software exchange service, cooperative buying, a free telephone consulting service and information about foreign equipment interfaces.

The group will also act as a personnel clearinghouse. "We find that technical people who like to work on Burroughs computers are not quite as available as IBM-oriented technical people," Clark noted, "so we try to match Burroughs technicians' resumes with job orders from installations."

In addition to the free telephone consulting service, BWI also has three people available for on-site in-depth consultation aimed at specific problems, in which case the service would not be free.

Furthermore, "We have established a limited marketing arrangement," Clark explained. "For example, if a Burroughs user has developed a particular software package in the insurance business and wants to recover some of his investment by selling it to another user, we'll do the marketing promotion for that package.

"If the developer then in fact sells that package to another user because of our efforts, then we'll collect a broker's fee on it."

Direct-Mail Solicitation

How does BWI attract members? Through direct-mail solicitation, according to Clark. "Over a four-month period, we bought mailing lists from anybody who purported to have a list of Burroughs users for sale.

"We merged and sorted and now we have what we feel is a very complete list of 11,500 Burroughs users. We've done several direct-mail solicitations to that user base, explaining who we are and what we're trying to do. We've sent our publication throughout the user base, too.

"One of the things we're finding a challenge is that Burroughs is out there selling all these new users equipment," Clark noted. "It's quite a hard task for us to keep up with who the new users are."

Once BWI finds out about a new user, however, a 500K-byte Burroughs B2800 CPU helps keep track of each one, Clark said. He stressed that BWI is not limited to Burroughs users only, but is open to "anyone who is interested in Burroughs."

Future plans for BWI include expansion to offering the same services for users of other vendors' products, Clark said. "We've found the trade publication aimed at a specific vendor's users has been very well received by Burroughs users, so we've consequently made plans to do it with other vendors in the future."

Expected to come to fruition "within the year," the expansion will involve "two or three" other vendors who cannot yet be identified, Clark said. BWI charges annual dues of $92 and is headquartered at Suite 301, 7600 Chevy Chase II, Austin, Texas 78752.

Underground Terminals Help Hike Coal Production by 20%

CHICAGO — Inland Steel Coal Co.'s Mine No. 1 in Sesser, Ill., is producing 20% more coal, and systems supported by underground terminals are part of the reason for the increase, according to Alan Stiefel, manager of raw materials systems.

Stiefel described the installation, which is believed to be the first commercial application of a computer to underground mining in the U.S., to the American Mining Congress here this month.

The computer system is one component of a communication and informations system that was developed to improve productivity as a result of recommendations from a 12-person Operations Task Force. "No one [of the 30 implemented task force recommendations] can be pointed to as a panacea, but the trend of declining production has been reversed with a 20% increase in production since 1977," he said.

Four Systems

Four systems were recommended by the task force in response to the particular management needs in an underground mine environment: Production Status and Recording, General Underground, Spare Parts and Maintenance, and Safety. Stiefel stressed the importance of an operational rather than an accounting orientation where he noted "we were looking to make more bucks and would worry about counting the bucks in the future."

The coal company, a wholly owned subsidiary of Inland Steel Co., responded to this orientation by assigning to the development team a full-time foreman picked for his operating experience rather than his educational background.

Other members included two business analysts and a programming project leader from the corporate staff, who moved into housing near the mine location, and three programmers at the data center in E. Chicago, Ind.

Three alternatives were considered when determining what hardware would be used to support the new systems. The first was a stand-alone small computer installed in Sesser; second was a terminal with high-speed printing capability and on-line CRTs connected by phone lines to the corporate com-

(Continued on Page 92)

Nixdorf Enhances 8870/1 CPU, Boosts Memory and Throughput

BURLINGTON, Mass. — In line with its commitment to distributed data processing systems (see story on Page 107), Nixdorf Computer Corp. here introduced a computer system which is essentially an upgrade to the company's 8870/1 workstation-oriented CPU. The enhancements include increased main storage and disk capacity, increased system throughput and several peripheral devices.

Designated the 8870/3, the system includes 512K bytes of main memory, up to 264M bytes of disk storage capacity, a 26-, 39- or 52M-byte cartridge module disk and an eight-color graphics plotter. CPU execution time is reportedly 700 nsec, resulting in throughput speeds "twice that of the 8870/1," a company spokesman claimed.

The 8870/3 can handle a maximum of 32 workstation peripherals and features simultaneous time-sharing access and bisynchronous communications with other computer systems. It is software-compatible with the 8870/1 and supports Nixdorf's Niros operating system and the Tamos operator control system.

Purchase price for the 8870/3 ranges from $22,800 to approximately $300,000, depending upon configuration. Further information is available from Nixdorf Computer Corp. at 168 Middlesex Tnpk., Burlington, Mass. 01803.

While Delays Discourage Others

Three Firms Praise 4331 Delivery, Performance

PORTLAND, Ore. – While IBM lost a potential 4331 customer in Chicago because of delays in delivery of its processor [CW, May 12], three companies in this area were unanimous in expressing satisfaction with both the delivery schedule and the performance of 4331 mainframes installed within the last year.

PHA Life Insurance Co. here installed the 4331 to help it maintain "a net growth of 25% annually," according to Skip McNeil, DP manager.

The individual and employee benefits insurance company had already upgraded from a System/3 to a 370 Model 115 in order to keep pace with its growth in premiums from $1.3 million to $20 million in an 11-year span.

The next step would have been to go with a 370 Model 135 "or maybe a 138," he continued, "[but] we decided to skip a larger 370 and go for the 4300 because, for a little less money, it was possible to obtain the increased performance vital to maintain our growth rate."

'Solid' Performance

Conversion from the 115 began in August 1979 and "I've never seen a computer as solid [as the 4331]," McNeil said. "We've never been down since the conversion was completed in October."

The company's hardware configuration includes 3310 and 3340 disk drives, two 3277 and six 3278 CRTS. Applications running in the environment include general ledger processing, policy administration for group life, health and retirement policies, benefit payments and commission payments for independent agents.

Future plans involve replacing the 3340s and 3370s sometime before October 1980 and building an on-line group policy administration system this year.

The Building Materials Group of Willamette Industries, Inc. received its 4331 "faster that I thought we could, [and] while the 4331 costs slightly more than the previous computer [a 370/158], it yields three times the performance," George Johnston, manager of accounting and DP for the Building Materials Group, maintained.

The mainframe is part of an information gathering network that also includes IBM 8100s at seven locations in Oregon and Louisiana with peripheral storage on six 3310 and six 3340 disk drives. The company plans to install Model 3680 terminals at its retail lumber yards "sometime this summer."

The 4331 ordered by Cowlitz County Public Utility District in Longview, Wash., arrived on a Friday to replace a 360 Model 30. "By Sunday, the 4331 was up and running with no hitch whatsoever," Ted McFadden, DP manager, recalled.

The payroll system on the Model 30 had been running in emulation of a 1440 Autocoder program, McFadden noted, so there are two separate programming generations running on the 4331.

Announcing an Intel Seminar on Microcomputer Solutions for the '80s.

The 1980s will require total microcomputer system solutions to enable you—the system designer—to keep pace with ever increasing application complexities. To help you plan for the '80s, Intel is sponsoring a series of one-day seminars discussing the directions for future VLSI computer solutions.

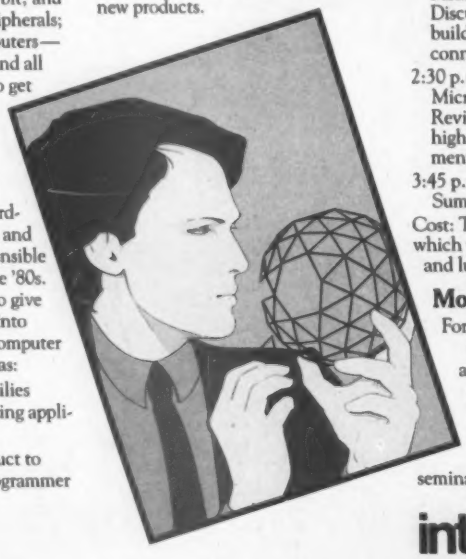
In these seminars, you'll learn how our VLSI solutions uniquely address the needs of the future. Topics discussed will include system-level integration in 16-bit, 16/32-bit, and 32-bit microcomputers; peripherals; software; single board computers—and more. In short, you'll find all the information you need to get a head start on your next generation of products.

Who should attend.

The seminar is intended specifically for software, hardware, and system engineers and managers who will be responsible for designing systems for the '80s. The seminar is structured to give you a comprehensive look into future directions in VLSI computer system development, such as:

- New microprocessor families designed to meet increasing application complexity.
- Tools to speed your product to market by increasing programmer productivity.
- Highest performance microsystem configurations achieved through co-processing and multi-processing.
- Integration of system programming and software functions into silicon.
- Integration of memory management and protection facilities.

Course materials will include a seminar notebook, and an *Advanced Data Catalog* which will outline Intel's comprehensive line of new products.



Agenda

8:00 a.m.
Registration

8:30 a.m.
Introduction of Intel's total solution approach

10:30 a.m.
New Microprocessor Products
Preview of three microprocessors covering 16-bit, 16/32-bit, to 32-bit complexity

12:00 Noon—Lunch

1:00 p.m.
Microsystem architecture
Discussion of new peripheral building blocks and system interconnects

2:30 p.m.
Microsystem software
Review of new operating systems, high level languages and development tools

3:45 p.m.
Summary and questions/answers

Cost: There is a $15.00 registration fee which will cover seminar material and lunch.

More information.

For registration information and to guarantee reserved space at the seminar, please contact your local Intel sales office a minimum of one week prior to the seminar in your area. The person to contact for your seminar is listed below, so call today.

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Seminar Date	Location	Contact	Phone
May 13	Santa Clara, Ca.	Bob Cifranic	(408) 987-8086
May 16	Seattle, Wa.	Steve Prue	(206) 453-8086
May 20	Baltimore, Md.	Steve Kay	(301) 796-7500
May 21	Cincinnati, Oh.	Dave O'Hanlan	(513) 890-5350
May 22	Detroit, Mi.	Stan Korus	(313) 353-0920
May 28	Minneapolis, Mn.	Blain Erskine	(612) 835-6722
May 29	Chicago, Il.	Tom Alwicker	(312) 981-7200
May 29	Orange County, Ca.	Dave Neubauer	(714) 835-9642
May 30	Cleveland, Oh.	Steve Turcola	(216) 464-2736
June 16	Los Angeles, Ca.	John Alfoldy	(213) 986-9510
June 16	Boston, Mass.	Bruce Giron	(617) 667-8126
June 17	Manhattan, N.Y.	Don Buckhout	(516) 231-3300
June 17	Denver, Colo.	Pat Maley	(303) 321-8086
June 18	North New Jersey, N.J.	Tom Trainor	(201) 225-3000
June 19	Houston, Tx.	Larry Gast	(713) 784-3400
June 19	Philadelphia, Pa.	Gene Murphy	(215) 542-9444
June 20	Dallas, Tx.	Dave Takacs	(214) 241-9521
June 24	Toronto, Canada	Franca Martinek	(416) 675-2105
June 25	Montreal, Canada	John Freeman	(613) 829-9714
June 27	Long Island, N.Y.	Don Buckhout	(513) 231-3300
July 10	Phoenix, Az.	Phil Richards	(602) 997-9695
July 15	Portland, Ore.	Steve Dallman	(503) 641-8086
July 16	Salt Lake City, Ut.	Bob Spina	(303) 321-8086
July 22	Milwaukee, Wisc.	Karl von Spreckelsen	(414) 784-9060
July 23	Kansas City, Ks.	Tom Izzo	(913) 642-8080
July 24	San Diego, Ca.	John Linn	(714) 268-3583
August 5	Melbourne, Fla.	Don Dabney	(305) 626-2393
August 6	New Haven, Conn.	Bill D'Eramo	(203) 792-8366
August 7	Rochester, N.Y.	Bill D'Eramo	(716) 254-6120

Terminals Boost Coal Production

(Continued from Page 91)

puter center in E. Chicago; third would be some mixture of the first two.

The technical staff recommended utilizing the corporate computers – two IBM 370/168s and a 3032 – for the following reasons: The large data center would have more capacity to handle historical data for analytical studies, and the applications could be brought up in less time by avoiding the installation of new software and equipment.

The current hardware configuration at the mine includes 14 CRTs from Harris Corp., the majority with attached printers, five of which are located underground. The terminals are linked so that shift foremen can direct 40-person mining crews working "faces" as far apart as 8 miles.

Applications Implemented

The Production Status and Reporting application was implemented in September 1978 and is used to provide information on the status of all working sections, quantity of coal mined and reasons for any delays in production to three communications coordinators in a building on the surface.

The General Underground system is used to control the supporting work essential to keeping working places operational. In addition to keeping track of jobs involving general labor, drainage and belt work, the mine superintendent has been able to significantly reduce the time required for month-end reporting.

The Spare Parts and Maintenance system includes inventory control, equipment breakdown (bill of materials) and purchasing. The equipment breakdown facility has been "extremely critical" in reducing downtimes on equipment.

The only item in the original project list which was not completed in the specified 15-mo timetable was the Safety system. This application, which will provide information on substandard conditions, violations and corrections, is currently being installed.

Disk System for VAX Users Stores up to 600M Bytes

EATONTOWN, N.J. — The DD 80 disk storage system introduced by Diva, Inc. here provides Digital Equipment Corp. VAX-11/780 users with 80M to 600M bytes of storage, depending on which drive is selected.

The system can be expanded to 5.2G bytes by adding a total of eight disk drives and provides overlap/seek and data transfer speeds "up to 1,209K bytes/sec," according to the company.

Hardware includes a Computroller V microprocessor-based controller, a synchronous bus interface and the user-specified drives. The standard system features software transparency to the DEC VMS operating system, self-checking diagnostics and accommodation of mixed-capacity drives.

Dual-port drives and off-line pack formatting are available as options.

A basic controller with one 600M-byte drive costs in the neighborhood of $37,000 to $38,000. The DD 80 will be shown for the first time at the National Computer Conference by Diva, 607 Industrial Way., Eatontown, N.J. 07724.

Bits & Pieces

MDS Rental Prices Up 5% on Series 21

PARSIPPANY, N.J. — Effective May 1, Mohawk Data Sciences Corp. (MDS) here increased rental prices by 5% for its System 21/20 and 8% for the System 21/40 distributed data processing (DDP) systems.

Increases of from 5% to 8% were implemented for selected series 21 peripherals and features, and maintenance and installation prices for all series 21 products were increased by an average of 10%.

MDS is at 1599 Littleton Road, Parsippany, N.J. 07054.

Air Conditioner Saves Computer Room Space

NIAGARA FALLS, N.Y. — A computer room air conditioner, specifically designed for installations where space is restricted, has been introduced by Hiross Denco here.

The Spacemaker II, offered in 3- and 5-ton sizes, is 41 in. high by 16 in. deep.

Options include audible and visual alarms and, for northern and central states, an automatic shutoff of the mechanical refrigeration system when outside temperature reaches 35°F.

Price range of the Spacemaker II is $3,000 to $5,500, depending on configuration. More information is available from Hiross Denco, P.O. Box 290 L.P.O., 2107 Liberty Drive, Niagara Falls, N.Y. 14304.

Label Printer Meets NRMA's OCR Specifications

DAYTON, Ohio — A label printer that reportedly meets the optical character recognition (OCR) specifications of the National Retailers Merchandising Association (NRMA) has been introduced by Monarch Marking System, Inc., a subsidiary of Pitney Bowes, Inc. here.

The tabletop Model 1644 provides 40-char. capacity at 10 char./line. It accepts labels ranging from 1.1 in. wide by .95 in. to 2.312 in. high.

A warranty policy is included with the purchase and an optional preventive maintenance inspection agreement is available. The 1644 costs $1,925 from Monarch Marking Systems, P.O. Box 608, Dayton, Ohio 45401.

3M Cleaning Kits Include Diskettes, Cleaning Solution

ST. PAUL, Minn. — Cleaning kits for diskette heads, including two diskettes and a bottle of cleaning solution are available in 8-in. and 5.5-in. sizes for $30 each from 3M Co., P.O. Box 33600, St. Paul, Minn. 55133.

Shugart Fixed Disk Drive Doubles Capacity of SA4008

SUNNYVALE, Calif. — A 58M-byte, 14-in. Winchester fixed-disk drive that reportedly offers the lowest cost per 1M byte in its capacity range is available from Shugart Associates, Inc. here.

The SA4100 unit is an addition to Shugart's SA4000 fixed-disk drive series, which includes the 14.5M-byte SA4004 and 29M-byte SA4008. The same interface approach was used on the SA4100 as on the other models in the series, enabling design engineers to "more easily upgrade" existing systems, according to the company.

Performance specifications include a transfer rate of 7.1M bit/sec, average access time of 65msec and average latency of 10.1 msec. Recording density is 5,534 bit/in. with a track density of 172 tracks/in. The 40-lb unit is mounted in a 19-in. Retma rack and uses about 5.25 in. of panel space. Overall power requirements are reduced Shugart maintained, because of an actuator system that includes an open-loop stepper motor matched with circuitry to step with 24V.

Availability of the SA4100 is expected in the fourth quarter of 1980 with a cost under $3,000 in 500-unit OEM quantities from Shugart Associates, 435 Oakmead Parkway, Sunnyvale, Calif. 94086.

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Second International User

Library Service Bureau Using Honeywell CP-6

TORONTO — The second largest library service bureau in North America has become the second international user of Honeywell, Inc.'s Control Program 6 (CP-6) operating system.

The University of Toronto Library Automation System (Utlas), a self-supporting subsidiary of the university, has purchased two Honeywell Level 66/DPS/C large-scale, distributed processing systems on which to run the CP-6.

The system was designed to provide on-line processing while simultaneously accommodating multiprogrammed local and remote batch processing — capabilities that are important for supporting Utlas' applications.

Utlas has been supplying computer-based systems and services to libraries since 1973 and has grown into one of the largest on-line computer systems for library cataloging in the world.

Batch processing at Utlas includes production of library catalogs and output for card catalogs and computer output microfilm (COM) catalogs. Utlas reportedly pioneered the use of COM catalogs in libraries. Currently, the firm produces more than 75 catalogs, which range in size from one fiche to the world's largest with more than six million entries.

On-line access to these catalogs enhances and simplifies the search for books, films and other materials in Utlas' own and subscribers' libraries.

Central Data Base

The central data base at Utlas houses more than seven million catalog records, of which almost five million are unique. All records can be shared by Utlas clients across Canada and the U.S.

The group's services are provided in both French and English. Its COM and laser printing services offer a 189-char. set used for output in more than 100 languages. Utlas' reduced cataloging costs are said to make improvement of public services to library patrons more affordable for libraries.

The central data base offers the capability of incorporating changes that are specific and unique to each of the libraries concerned, and its automation increases speed, efficiency and accuracy in the updating and editing of catalog records.

The recent enhancement of the Utlas system to include "authorities control" — use of standard forms of names — increases the utility of the data base by linking such apparently different records as "Mark Twain" and "Samuel Clemens."

The central data base includes not only bibliographic data, but it also directly informs the user which library has it and where that information is located.

For instance, at any of the almost 250 terminals scattered from Saint John's, Nfld., to Victoria, B.C., a library can find the exact location of the seven million books, periodicals, films, maps and other material housed in the data base. Exact title or subject names are not required because the user can browse through the data base using Boolean operators and partial text.

Through the on-line system at Utlas, libraries can receive a wide range of library catalog cards, COM catalogs and book catalogs. In addition, data stored in the computer is used to produce various types of specialized listings for the Utlas user.

For example, specialized catalogs of audiovisual materials or lists of materials for the handicapped are available. Currently, a specialized catalog of material in Ojibwe and Cree languages is being created.

Ease of Conversion

The purchase of the Honeywell systems with the CP-6 operating system is a logical extension of the present Xerox Corp. Sigma computer equipment used by Utlas, according to George Gorsline Jr., manager of network planning and operations and chairman of the exchange user group.

"CP-6 is a giant step beyond CP-V," Gorsline noted, claiming that its features include "mature commercial processing and the best time-sharing in the marketplace.

"We're excited about CP-6 because it is a reimplementation of CP-V on an established hardware base by the same people at Honeywell's Los Angeles Development Center with whom we have been working for many years," he added.

This continuity of support staff and of operating system personality — responsiveness, common file format and easy-to-use Job Control Language and utilities — makes conversion much less formidable," he maintained.

Future Growth

"The data base currently has more than seven million records and is growing at a rate in excess of two million per annum. Yet we can still do a full search for an item in one to three seconds under peak loads," Gorsline said. "With CP-6, we expect to grow to 500 or more concurrent users and expand the data base to 50 million records with similar or better response."

Gorsline indicated that the two-part conversion would be a big job, moving from Meta-symbol (machine) language applications on a locally written file management system to a Cobol/IDS-II environment.

"We think the effort to convert to CP-6 is going to be much less than to go to any other non-CP-V system," Gorsline said. "As distributed processing becomes more of a reality, this transportability into network nodes or intelligent terminals will become an increasingly attractive option."

The installation of the CP-6 system, a DPS/C5, was completed in October 1979. The installation of the second system, a DPS/C3, should be completed by the same time this year.

Prior to delivery of the CP-6 system, Utlas installed Honeywell-built peripherals on its Sigma systems, including 40 units of 200M-byte disks, MOS memories and Level 6 front-end processors

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Or write: Ruth Levy, Itel, One Embarcadero Center, San Francisco, California 94111

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Data Entry Meet Slated

STAMFORD, Conn. — A miniconference designed to help data entry professionals improve management skills, reduce costs and keep pace with expanded technology is being offered by the Data Entry Management Association (Dema) at the Sheraton Centre in New York on June 2-3.

Two seminars which will address methods to improve data entry productivity and distributed data entry in the automated office will also be scheduled on June 3-4.

Total registration fee is $400 for Dema members and $420 for nonmembers. Further information is available from Dema, P.O. Box 3231, Stamford, Conn. 06905.

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DP Dialogue

Notes and observations from IBM that may prove of interest to data processing professionals

Ingredients are mixed for a perfume fragrance at International Flavors & Fragrances. To protect valuable formulas during transmission, IFF uses IBM 3845 and 3846 Data Encryption Devices.

With Data Encryption, Scents are Safe at IFF

Some of the world's most fragrant data traffic flows between New York City and Hazlet, New Jersey. As International Flavors & Fragrances Inc. (IFF) transmits valuable formulas for synthetic scents between its Hazlet headquarters and its New York office through the public telephone system, an IBM data encryption device protects them from unauthorized access.

Referring to the IBM 3845/6 Data Encryption Devices, Lewis G. Augustine, director of systems and data processing, says: "We plugged them in and they worked; that was the entire installation procedure. And data encryption has never been the cause of any operating problem."

Few compounds are more complex than the fragrances used in toiletries, detergents, cosmetics and many other consumer items. The bill of materials for one scent typically includes thousands of line items, and its summarized "explosion" can require 50 pages of printout from the firm's IBM System/370 Model 138 at Hazlet. Augustine points out that fragrances are formulated by combining "subcompounds" – recognized varieties such as lilac and geranium – which are themselves mixtures of subcompounds and primary ingredients. A completed formula may include subcompounds at as many as 33 levels.

"Our creative group in New York develops a thousand new fragrances a month to submit to our customers," Augustine continues, "so there is a continuous heavy flow of formulas between the New York office and our technical people here. This traffic is multiplied because a single fragrance often must be formulated many times: a scent for, say, a line of related toiletries works differently in the cologne, soap, deodorant, and so forth.

"The ability of our creative group to develop a fragrance that meets a customer's need – and to synthesize that fragrance suitably for his product – is our major business asset. The security of that data traffic is vital to us. With the IBM data encryption devices, we have the absolute security of communication we need."

The 3845 and 3846 use the U.S. National Bureau of Standards Data Encryption Standard, a process for encrypting data under control of a key-variable supplied by the user.

"Without these devices, our alternatives would not have been attractive: to develop our own software encryption method and install a decrypting computer in New York. Or to hire couriers to hand-carry formulas. Obviously, the IBM devices have been far more simple, economical, and effective."

Dictionary Insures Data Integrity at Cities Service

"We concentrate on making data meaningful," Larry Myerley of Cities Service Company says. "Vital strategic data must be current, accurate and secure. The dictionary plays a vital role in achieving that."

Myerley, manager, data base development, is discussing the role of the IBM DB/DC Data Dictionary. Cities Service, he explains, has made data management for its corporate information system a separate professional function, to define and standardize data elements used in common by many applications.

Myerley's staff has identified 28 attributes of a data element, he continues, such as the coding structure, the input source, persons authorized to access or change it, and other data with which it is interdependent. The dictionary stores these attributes of each element, the identity of all programs that use or affect it, and a record of the frequency with which it is used. Naming standards created at Cities Service are used to assign both computer-oriented and business (i.e., end-user oriented) designations, with the dictionary providing the cross-references between them.

The Cities Service corporate computer center in Tulsa, which includes an IBM System/370 Models 168AP and 158AP, uses the Information Management System/Virtual Storage (IMS/VS). "When we began putting data in IMS instead of imbedding it in individual programs," Myerley notes, "we immediately found that we needed a tool to keep track of it, even on a small-scale pilot project. We couldn't keep the information in our heads."

It is important, he points out, to respond to changing needs. As an example, he cites the introduction of a new employees stock ownership plan that required 11 or 12 new programs.

"With the aid of the dictionary," he adds, "we had no difficulty adding the required elements to the IMS data base without impacting existing programs.

"Or consider a set of 12 master files for financial processing. They support about 300 programs serving different interests, but the dictionary enables us to identify every application program using any data element, and to measure and plan the work of preparing these applications to migrate to IMS.

"Eventually, the data system, though independent, will be available to the information systems, and will be dedicated to producing valid, current data. It will be stable, changing slowly. But the information systems – processing data to produce useful information – will be dynamic, changing as needs change. The stability of the data environment, which will be achieved with the help of the data dictionary, will let us respond fast to these demands."

Interior of a Cities Service production platform in the Gulf of Mexico. Cities Service uses the IBM DB/DC Data Dictionary to help assure the integrity and validity of data in its corporate information system.

DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.

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Without easy-to-use, flexible terminals, even the smartest computer can act pretty dumb.

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Intelligent Graphics Terminal

Our top-of-the-line HP 2647A has a Multi-Plot feature that lets you plot your tabular data in a variety of formats without writing any software. Or, for more sophisticated applications, you can program the terminal using simple, English-like commands in AGL, our graphics extension of BASIC.

Interactive Graphics Terminal

The high-performance HP 2648A lets you plot tabular data without writing any host CPU software. It combines full alphanumerics and graphics capabilities, including autoplot, raster scan, area shading and rubber band line.

Interactive Display Station

The HP 2645A is the smartest of our alphanumeric terminals. Microprocessor control provides easy editing, scrolling and forms-building capability, and special user-definable "softkeys" streamline repetitive jobs. Optional dual cartridge tapes provide up to 110K bytes of storage each.

Interactive Terminal/Printer

The easy-to-use HP 2621 interactive terminals have typewriter-like keyboards with control keys labeled right on the screen for self-test, configuration, display and editing. And with just a keystroke, the 2621P's built-in thermal printer will deliver a printout from the screen in seconds.

Impact Printers

Hard copy is easy with our microprocessor-controlled HP 2635 Printing Terminal and 2631 Printer. The easy-to-read 7 x 9 dot matrix meets the 128-character ASCII Standard, allows true underlining and descenders, and prints six-part forms. The 2631G model even prints graphics output from HP 2647/48 terminals.

Both the 2635 and 2631 zip along at 180 cps in both directions. The microprocessor determines the optimum print path, and a high-speed slew speeds up printing columnar data.

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od as the terminals it supports.

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Data Capture Devices

Designed for easy operation by plant personnel, the table-top HP 3075A and wall-mounted HP 3076A terminals can be configured for applications like job or product status tracking, labor data reporting, and work-in-progress monitoring.

The HP 3077A time reporting terminal has a built-in clock/display and punched badge reader for time and attendance applications.

Graphics Plotter

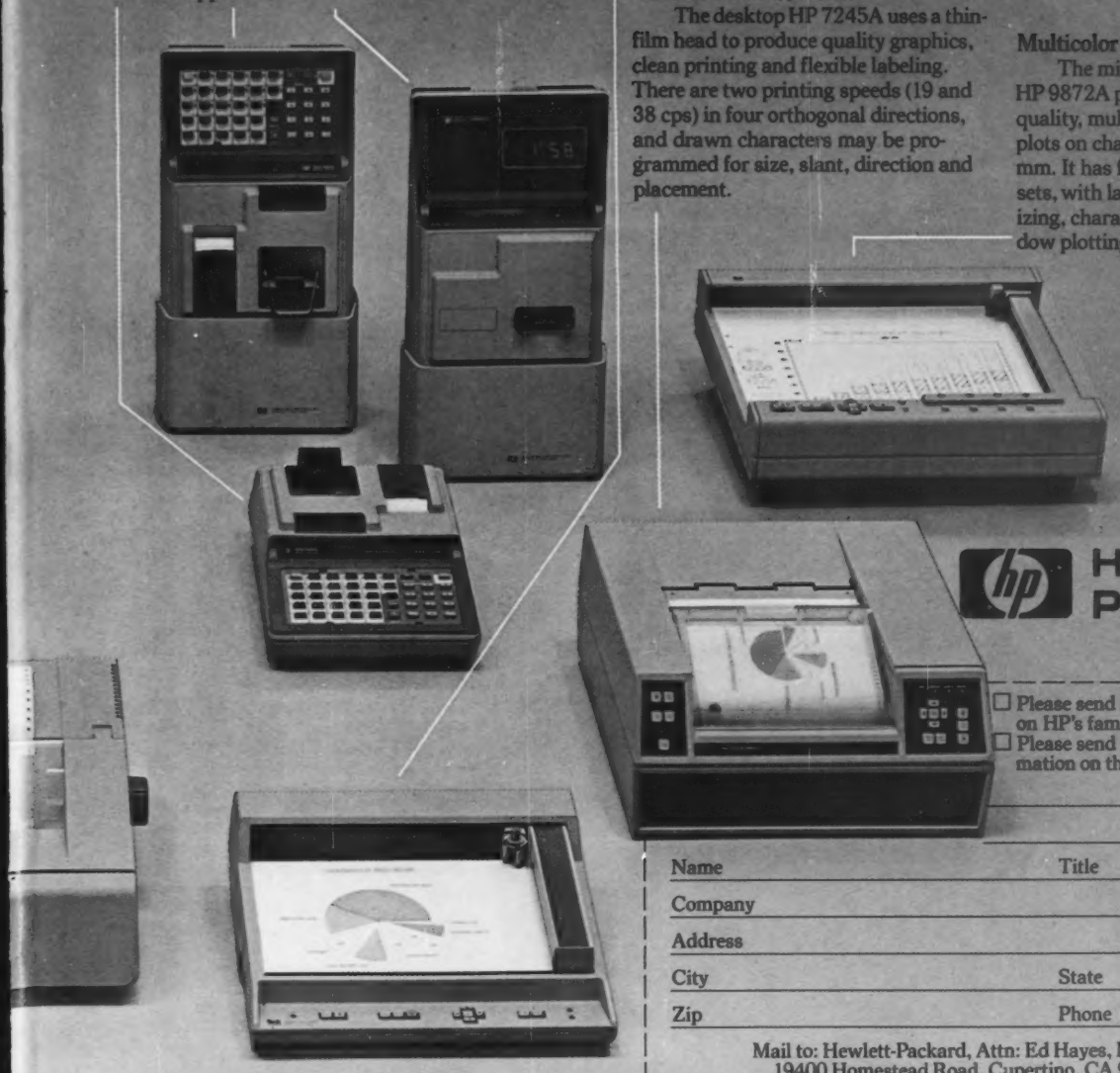
The HP 7225A offers a cost-effective approach to professional hard copy graphics. By changing a plug-in module, the 7225A will provide the appropriate interface, language, and graphics capabilities for a variety of computer and instrument systems.

Thermal Plotter/Printer

The desktop HP 7245A uses a thin-film head to produce quality graphics, clean printing and flexible labeling. There are two printing speeds (19 and 38 cps) in four orthogonal directions, and drawn characters may be programmed for size, slant, direction and placement.

Multicolor Graphics Plotter

The microprocessor-based HP 9872A plotter produces high-quality, multicolored graphic plots on charts up to 280x432 mm. It has five built-in character sets, with labeling, point digitizing, character sizing and window plotting capabilities.



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ICL Canada Brings Out Family of IBM Rivals

TORONTO — A range of medium-powered computer systems that will face IBM's System/34, System/38 and the 4331 at the top end has been introduced by ICL Computers Canada, Ltd.

The ME29 Model 35 and Model 45 "will be 1% to 15% less expensive" than corresponding IBM systems, according to Thomas J. Woodhill, president, and will offer up to five times the DP throughput of ICL's 2903/4 mainframe.

Both the Model 35 and 45 utilize a microprogrammed processor operating at speeds in excess of 3 million instruction/sec with data transfer rates of 4M byte/sec, the company claimed.

The Model 35 is available with main storage ranging from 256K to a maximum of 1M bytes; the Model 45's main memory range is from 384K to 1M bytes. Either 64K bytes or 128K bytes of control memory with a 155 nsec cycle speed is available for systems microcode.bytes of control memory, a 1M-byte flexible disk drive, 35M bytes of fixed disk storage, a workstation and a printer is about $75,000.

ICL Computers Canada, Ltd. is at 1 Tippett Road, Downsview, Toronto, Ont. M3H 5T2, Canada.

Standard Oil Adds 470s To T/S Network of 370s

SAN FRANCISCO — Standard Oil of California here has added three Amdahl Corp. mainframes to its time-sharing network in order to meet a demand which has been growing at a rate of "more than 50% a year compounded."

The company began running out of time-sharing capacity on its IBM 370/-168 and 370/158 in early 1978. "We chose the Amdahl 470V/6 primarily on the basis of delivery and price/-performance considerations," William T. Houghton, manager of the Computer Operations and Systems Division, maintained. "In addition, National CSS, Inc., whose time-sharing software we had been using since 1970, had a 470V/6 already installed and running smoothly, so we felt there would be little risk to us in moving to an Amdahl computer."

The first 470V/6, with 6M bytes of main memory, was installed in April 1978; the second was installed the following August. A year later, in August 1979, Standard Oil added an 8M-byte 470V/7, then field-upgraded that machine to a V/8 this April.

The time-sharing computers run under National CSS VP/CSS operating system 24 hours a day, every day of the week. They are configured with eight strings of IBM 3350s with eight drives per string and a storage capacity of 317M bytes per drive.

Other peripherals include 11 IBM 2305 drums, 16 tape drives and 4 Comten, Inc. 3670 front-end processors.

Heavy Usage

At peak demand, about 350 people are accessing the system through dial-up lines at speeds of 300- or 1,200 bit/-sec or at 9,600 bit/sec over leased lines with remote communication handled by Tymshare, Inc.'s Tymnet. Approximately 60% of this usage comes from the Computer Services Department for program development and maintenance.

Other heavy users include Standard Oil's refineries and Chevron Research. Most of the refinery applications are operationally oriented and range from analyzing individual process unit data and recommending operational improvements to scheduling and long-range planning tools for the total refinery.

Chevron Research uses the system to support all its refinery design activities.

It is projected that the system should be able to handle "more than 500" simultaneous users when the computers are configured to their maximum, Houghton said.

Centronics Hikes Printer Prices

HUDSON, N.H. — Centronics Data Computer Corp. has announced price changes which affect most of its printers as well as rates for spare parts and service.

With the exception of Centronics' 730 and 737 small business printers, prices for the 100, 300, 500 and 700 series matrix printers and the 6000 series bank line printers were increased 6%.

The sole reduction in pricing was for the nonimpact Microprinter P-1, whose price was reduced "up to 30%."

Printers ordered before May 31 will not be affected by the price changes if delivery is required by Aug. 29. Orders calling for delivery after Aug. 29 or received after May 30 will be at the newly announced prices.

Spare parts prices have been raised eight percent on current models and ten percent on the older 100, 300 and 500 series effective June 1. While the charge for service when the customer brings the printer to a service center remains unchanged, most other service rates were increased 10% effective April 1.

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In Southeastern Massachusetts

COM-Based Cancer Registry Serving Hospitals

By Stephen L. Priest
And Vincent J. O'Sullivan
Special to CW

BROCKTON, Mass. — In Computerworld's *Special Report, "Stretching the DP Dollar" [CW, Sept. 24], an article by Stephen L. Priest and Robert L. Sheehan described the cost savings realized by Brockton Hospital in converting general accounting and business office reports from hard copy to microfiche. The hospital was also beginning to use microfiche for its cancer registry reports. The following is an update on the various reports now offered by the registry.*

The Brockton Hospital Southeastern Massachusetts Cancer Registry (Semcare) provides an annual follow-up of every cancer patient as well as incidence and survival statistics to the medical staffs and administrations of almost all the major hospitals in southeastern Massachusetts.

And, since Massachusetts is apparently about to enact legislation that would make the reporting of the incidence of cancer mandatory, we are in the process of offering the registry's reporting service to all hospitals within the state.

Beginning with four hospitals in the immediate Brockton area, the system has expanded to include 14 hospitals in the southeast region of Massachusetts. With these additions, the registry is able to provide areawide, detailed analyses for southeastern Massachusetts.

In line with this expansion, a Professional Advisory Committee has been established to oversee the medical appropriateness of the registry system. The committee is comprised of a representative physician from each participating hospital, as well as an appointed registry physician consultant, information systems specialist and the regional registry coordinator.

The committee meets on a quarterly basis to review the input and output of the registry and seeks to maintain and improve the system. The use of this committee makes each hospital a working partner in the registry with opportunities and responsibilities to provide user feedback.

Brockton Hospital recently received its third consecutive accreditation from the American College of Surgeons (Acos), awarded in recognition of its successful cancer management program. Within the system, other hospitals have also been able to obtain individual accreditation when they became eligible —none has been refused once it has requested and completed the ACOS survey review.

Media Differences

Source document microfiche and computer output microfiche (COM) are often equated, but there are several important differences between the two media.

The source document microfiche process involves taking pictures of actual paper records and developing the film, in much the same way that photographs are taken with a conventional camera.

This process can affect the quality of the resulting record as well as the amount of time needed to actually obtain it. For example, if the original document is illegible or damaged, the microfiche will reflect that fact no matter how technically precise the process is. On the other hand, faulty focusing or missed exposure will result in bad film no matter how good the original copy is.

The source document microfiche process is time-consuming, necessitates physical removal of valuable material and can result in increased reference time and frustration if a needed record is "out to be microfilmed."

COM is technically an entirely different concept, and the results are more satisfactory.

The Brockton Hospital Semcare system uses an NCR Corp. C-200 system for its computer services. Nine-channel, 800 bit/in. magnetic tapes containing the reports intended for microfiche are picked up by a microfiche service bureau, Microdata Service Center, Inc., in Boston. Microfiche are returned to the hospital within 24 hours.

The record is "untouched by human hands," and the resulting text is clear and clean. Each 4.25 in. by 5.75 in. fiche can contain the equivalent of as many as 207 pages of 11 in. by 14 in. computer output.

Follow-up of patients provides the data base that generates survival statistics and, most importantly, helps to ensure that cancer patients are seen regularly by physicians.

The COM system has many advantages over the use of paper, especially in a cancer registry system that is batch-oriented rather than on-line and is spread over a fairly large geographic area. Microfiche enhances report utilization while increasing storage capacity, minimizing hospital costs.

The growing recognition of these advantages is illustrated by the fact that we have already provided software and documentation to five U.S. hospitals so that they can implement the identical system.

Priest is director of information systems at Brockton Hospital. O'Sullivan is regional registry coordinator.

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More Than 900 Systems Rated

Polled Users Happy With Present Gear

CHERRY HILL, N.J. — The majority of small business computer users are basically satisfied with their present systems and do not foresee any drastic equipment changes in the near future, according to a recent Management Information Corp. (MIC) survey.

In an effort to determine how well small business DP products are meeting user needs, MIC surveyed more than 600 companies across the country. In all, the companies represent nearly 900 installed small business computer systems and 1,446 peripheral devices. As part of the survey, MIC also collected data on 255 software products.

Users were asked to rate their equipment's performance, reliability, ease of use, service and support on a scale of 1 to 4, with 4 being the top rating. In the performance category, users compared their equipment expectations against vendor claims, while in the ease-of-use slot they were asked to consider the amount of time it took to train new personnel on their particular machines.

The results: Better than 70% of the users polled are happy and intend to stick with their present systems, 9.5% of the respondents are planning a change within a year and 19% of the users expressed interest in revamping their computer systems within three years. Reasons for wanting a change include technology and growth, bad service, an increase in price/performance and the quest for a faster and larger system, the report noted.

Interestingly, 25% more users want to stay with their present computer setups than users questioned last year in a similar MIC survey. In nitty-gritty hardware terms, six

(Continued on Page 106)

Manufacturer and Model	Respondents	Units	Performance	Reliability	Ease of Use	Service	Support
Basic/Four 400	10	19	3.6	3.5	3.8	3.5	3.5
Data General Nova	9	11	3.4	3.4	3.2	2.9	2.3
Digital Equipment PDP-11	16	17	3.4	3.2	3.2	3.0	2.3
IBM System 32	15	16	3.7	3.4	3.0	3.5	3.4
Microdata Reality	41	84	3.8	3.8	3.9	3.4	3.2
Wang 2200	10	11	3.8	3.7	3.3	3.5	2.8

Six manufacturers of the nearly 900 computer systems listed in Management Information Corp.'s annual small business computer survey are shown. Computers are rated from 1 to 4, with 4 indicating the highest rating.

Small Business System Gives Multiple Languages, Protocols

LEXINGTON, Mass. — NEC Information Systems, Inc. has introduced a small business computer that offers multiple programming languages, communications protocols, a text-processing capability and an integrated set of business application software.

The Astra Model 205 includes 128K bytes of main memory that is expandable to 256K bytes, two 1.2M-byte double-sided double-density diskette drives that can be expanded to four, a 120 char./sec printer and a CRT terminal. The system's communication protocols allow it to work as a stand-alone business computer, as a member of an Astra network or to access IBM networks under 3780 and 3740 batch or asynchronous modes.

The 205 utilizes a 16-bit microprocessor with 114 business DP-oriented instructions and supports Cobol, Basic and a macroassembler language.

The applications software programs include a recently developed text-processing program called Astra Write, a sales order processing and analysis package, inventory control, billing control, accounts receivable and payable, general ledger and payroll packages, a spokesman stated.

The Astra Model 205 costs about $13,310 and will be available in July. For an additional $330, a letter-quality Spinwriter printer may be substituted for NEC's matrix printer, the spokesman added from the firm at 5 Militia Drive, Lexington, Mass. 02173.

Disk Subsystem Reconfigured To Be Multibus-Compatible

SAN FRANCISCO — Micromation, Inc. has unveiled a floppy disk subsystem that is compatible with Intel Corp.'s Multibus and runs under Digital Research, Inc.'s CP/M and MP/M and all Intel software, including Isis II.

The MM-SBC-80 is a reconfiguration of the firm's Megabox series and incorporates a disk controller that is said to provide more features than Intel's ISBC-201 single-density and ISBC-202 double-density devices combined. The Micromation controller supports both Intel formats as well as IBM 3740 single-density soft-sectored format and the IBM System/3 double-density mode.

The MM-SBC-80 controls up to four Shugart Associates, Inc. 800/850-type 8-in. floppy drives or equivalents in both single- and double-density modes. With the device, the user can reportedly read and write from a single-density drive to a double-density diskette on another drive, or vice versa, a spokesman said. The controller automatically determines the density of the inserted diskette, with no console input required.

The two Shugart drives included with the system provide 1M byte of on-line data storage. However, an optional configuration uses two Remex 8-in. double-sided drives and gives 2M bytes of storage.

The system includes the controller, all cables, drives and power supplies and a rack-mount cabinet. The cost is $3,195, but the controller can be purchased separately for $995 from Micromation at 1620 Montgomery St., San Francisco, Calif. 94111.

Like the Lear Siegler ADM-31, a highly intelligent buffered terminal that practically thinks for itself. And the smarter ADM-42 with its 15-inch diagonal screen. Or the low-cost DUMB* terminal from LSI, the ADM-3A which at $850 makes a lot more sense than its name implies.

Plus the new LSI ADM-3+, with standard numeric pad and full-ascii character set. And the new Retro-Graphics™† package for the ADM-3A+.

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With Step-by-Step Software

Turnkey a 'Snap' for Business Users

NEWINGTON, N.H. — A multimicroprocessor-based small business computer containing software designed to lead the user through a variety of business applications has been introduced by EZdata, Inc.

The Simple and Natural Applications Programming (Snap) computer is a turnkey system with 48K bytes of resident memory, 2.4M bytes of dual-floppy double-density disk storage, a standard CRT terminal and a 50 char./sec printer. The system has a keyboard with 26 function keys and a numeric keyboard. In addition, the Snap computer can handle up to four CRT terminals, up to eight floppy and hard disk drives and a variety of high-performance printers, a spokesman claimed.

The crux of the system is the software, which is designed to lead the user through applications by offering a number of explanations, alternatives and assistance routines. For instance, a Help command is available that is said to fully explain each application step. Moreover, the software was designed to remind the user about display formats and to check back with the user if there are any questions concerning text misspellings.

The EZdata Snap

Software features include a conversational compiler, four transaction processing modes, an audit trail, fully assisted entry routines, data file sorts and variable-length data fields.

The Snap system costs $15,000, including the software license. Additional information on the small business system can be obtained from EZdata at Newington Industrial Park, Newington, N.H. 03801.

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VAX-11/780s, PDP-11s Get Color Graphics

MAYNARD, Mass. — Digital Equipment Corp. here introduced a family of graphics subsystems compatible with its PDP-11 computers and the VAX-11/780 minicomputer.

Supported by the RSX-11M, RSX-11S and VAX/VMS operating systems, the VSV11 and VS11 models are available with either a 19-in. VRV02 full-color display terminal or a monochrome VT100 terminal.

In addition to the terminal, the subsystem is composed of an image processor, a sync generator and image memory. It interfaces directly with the LS1-bus microcomputer and utilizes a bus converter for the PDP-11 Unibus interface. The image processor, based on 2901 bit-slice technology, supposedly allows data to be displayed "significantly faster" than the rate achieved by serial line graphics terminals.

The image memory is a video frame buffer with 512 by 512 by 2 bits of resolution and intensity in the basic configuration. It is switch-selectable for noninterlaced operation at 512 by 256 by 4 bits.

An additional image memory can be added to the subsystem to double the capacity for 16-color graphics.

The price of the VSV11 monochrome version begins at $7,900, and the color terminal option brings that starting price to $13,600. The monochrome VS11 starts at $8,600, with the color version priced from $14,200.

Deliveries are scheduled to begin in October from DEC in Maynard, Mass. 01754.

Cromemco Adds Graphics Link

MOUNTAIN VIEW, Calif. — Cromemco, Inc. has unveiled a graphics interface for its computer systems which can be used to display color or black-and-white images.

The Cromemco SDI consists of two circuit boards that plug directly into the S-100 bus of the firm's microcomputer systems. The device uses direct memory access to display the contents of memory and features high-point resolution, color map selection, a dual-page windowing function, an automatic area fill mode and a Northern Telecom Systems Corp. broadcast compatibility, a spokesman said.

The SDI displays images with up to 756 by 484 point resolution and can produce graphics in two different modes, nybble-mapped or bit-mapped. In the nybble-mapped mode, any 16 of 4,096 possible colors can be displayed in a single picture. In black-and-white, there can be 16 shades of gray, the spokesman claimed. The bit-mapped mode can display any two colors or straight black-on-white displays.

Finally, picture information is accessed by the SDI through the firm's 16K and 48K-byte two-port memory cards in the microcomputer. Use of the two-port memory for the display utilizes the MPU 75% to 100% of the time, depending on the application software, the spokesman said.

The graphics interface costs $595 from Cromemco at 280 Bernardo Ave., Mountain View, Calif. 94043.

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The PTS-2000 Series is Raytheon's brand new information display system for the Eighties.

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But there is where the similarities end. Because the PTS-2000 is designed to go far beyond alternative products of its class. It has far more intelligence, expandability, compactness, and upgradeability than any other 3270-type terminal system.

Soon it will be expanded to emulate 3274-type large-cluster systems, to support local disk drives for queued input, and to link Raytheon's VT word processors. Later, the family will grow even further—to become powerful SNA-compatible distributed processing, combined word and data processing, and network processing systems.

The PTS-2000 in 3276-mode operation is the start of an information display terminal family that will grow with your network needs far into the future. And with total compatibility and familiarity.

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WILMETTE, Ill. — The Wilmette Park District, a local government run recreation and service agency here, had more than 32,000 reasons for abandoning its service bureau-based DP operation and installing its own small business computer.

Since acquiring the Basic/-Four Corp. minicomputer system, the Park District has reduced its clerical staff, started turning out five times as much work on the same budget and has increased the services it supplies to the 32,000 people living in and around this village on the shore of Lake Michigan. In fact, getting the system was probably the most comprehensive, beneficial business decision ever made by the Wilmette Park District," according to Business Manager Ed Szillat.

The Park District currently has Basic/Four's System 410 with 96K bytes of memory and with a disk capacity of 42M bytes. The system also contains three local and two remote CRT terminals, a 150 line/min printer and a magnetic tape cartridge backup system.

The district started its in-house computer venture more than four years ago when it installed a Basic/Four Model 400 with a whopping 16K bytes of memory, Szillat said. "We selected Basic/Four equipment because of the computer's operating system," he added. "I had no computer background, and the system doesn't require any. It automatically checks program logic errors.

Park District officials opted for an in-house computer when it was decided that such a system would help control turnaround time, hold down costs, produce data in any format and, essentially, be more accurate. A dedicated system would also allow the district to use the same staff to operate the computer that previously prepared transmittal documents for the service bureau.

The declining cost of minicomputers and the fact that the Park District's annual budget had ballooned from $700,000 in 1969 to $3 million in 1975 also motivated officials to gravitate to an in-house computer.

Customized Software

Soon after the delivery of the Basic/Four Model 400 in early 1976, the district contracted with A.E. Klawitter and Associates of Glenview, Ill., to work with its staff in designing a comprehensive software program specifically suited to meet the local government's accounting and reporting needs. The program was designed, written, installed and operational by February 1977.

The software was transferred to the System 410 when it replaced the 400 in April 1979.

Today, the Park District has blossomed into a $4.5 million operation with 700 employees. Officials here are responsible for 20 parks, an 18-hole golf course, a number of pro shops, a restaurant, eight indoor tennis courts, two indoor ice skating rinks, two outdoor pools, a community center, two beaches and the functions of about 500 recreation programs.

No More Lines

Business Manager Szillat said the computer system handles all of the district's accounting and financial reporting, perpetually records statistical data on individuals-by-households and provides reports on trends and demographics. The computer is also used as a word processor to prepare brochure copy. It processes, in addition, about 20,000 activity registrations a year for the more than 1,500 class sessions offered by the district.

"With the computer, our registration system eliminated the need for people to wait in lines," Szillat continued. "We picked up a 10% increase in registrations the first year by eliminating lines. People can register by mail or by depositing an entry form in a special box."

The district's participant registration system was put to another use when it was modified for the North Suburban Special Recreation Association in nearby Highland Park. The modification lets that association provide services to the handicapped by listing such information as handicap, medication and physician.

Minicomputer TOTAL

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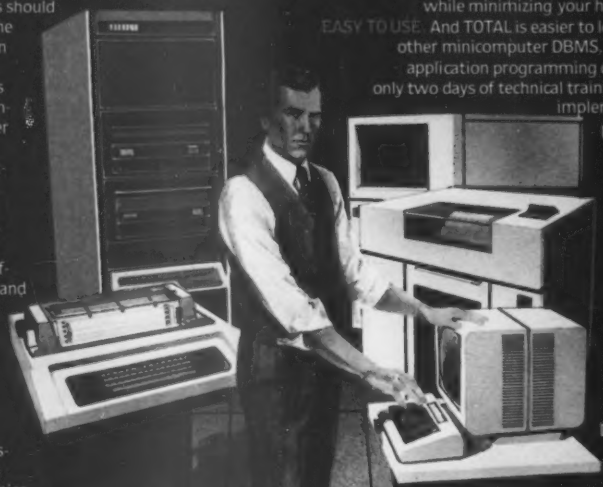

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PETE BLOZIS:
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"We resisted conversion as long as we could, and then discovered it was completely painless. The V-8585M hardware ran just as NCR predicted. VRX is more transparent than any operating software I have ever seen."

Peter P. Blozis (right) is Wilson's Vice President, Information Services Division. Lea Edmunds is Technical Services Manager.

* * *

WILSON'S is a chain of jewelry/ catalog showrooms that is spreading across the Sunbelt. And growing at the impressive rate of 37 percent per year. This growth has caused Wilson's to step through five NCR Century systems up to the V-8585M. Supporting an NCR system is easy. As Pete Blozis says "We can support our NCR V-8585M with fewer systems programmers than we'd need for other systems of comparable size."

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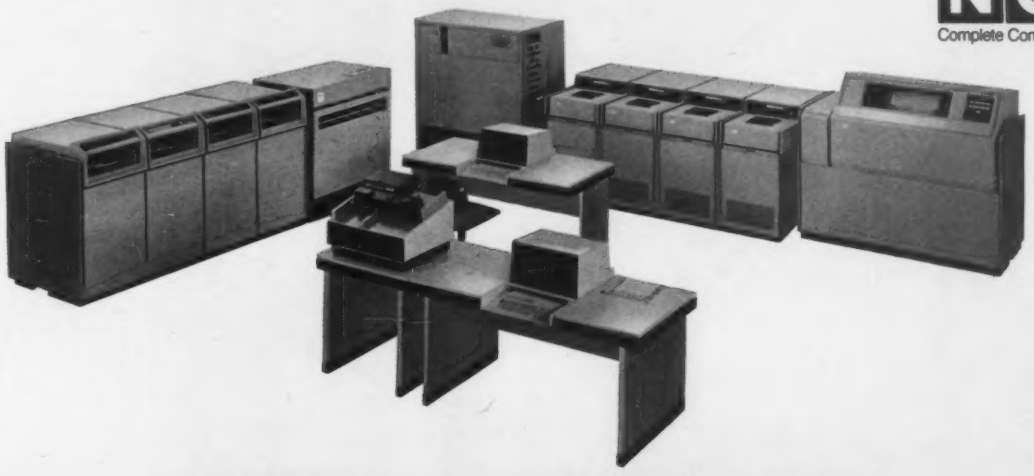

An NCR computer can make it happen for you, too.

Fleet Management Addressed

DALLAS — Century Computer, Inc. has introduced a microcomputer-based Fleet Management System that was designed to keep track of vehiculur downtime, monitor maintenance costs and provide data for equipment evaluation.

The turnkey system operates in a real-time mode and is fully documented for operational procedures, diagnostic routines, program logic and I/O steps.

The system features an 8-bit MPU with an RS-232C interface and a minimum of 32K bytes of memory. A CRT terminal, multiport multiplexer, tape and disk drives, paper tape reader, card reader and 600 line/min printer can also be attached to the system.

Basically, the system provides for on-line parts and labor posting and closing of repair and expense orders and offers an automated cost extension of reported labor hours, a spokesman stated. The unit notes the number of parts used to fix a vehicle.

In addition, the system can calculate the average failure rate for specificed components, enhancing the preventive maintenance procedure.

The Fleet Management System costs between $5,000 and $8,000, depending on the configuration. Century Computer is located at Suite 208, 3500 Midway Rd., Dallas, Texas 75240.

Majority of Polled Users Happy With Present Gear

(Continued from Page 101)

small business computers scored an average of 3.0 or better in each category with five or more responses. Those machines are Microdata Corp.'s Reality, which rated at least a 3.8 in performance, reliability and ease of use; Basic/Four Corp.'s Model 400; IBM's System/3 models 6, 10 and 15; and IBM's System/32.

Of these six systems, IBM's System/3 models 6 and 15 received the highest ratings in service and maintenance, while Basic/Four's 400 grabbed the highest slot for manufacturer support, the survey detailed.

On the other hand, the systems with five or more respondents that received the lowest ratings in service and support are Mini-Computer Systems, Inc.'s Micros, with a rating of 2.6 in service, and Data General Corp.'s Nova minicomputer, with a support score of 2.3. However, the Micros and Nova minicomputers both averaged above 3.0 in the performance, reliability and ease-of-use categories, according to the report.

Peripherals Ratings

On the peripherals front, those products that received a 3.0 or better in all categories with five or more responses include Applied Digital Data Systems, Inc., Basic/Four and Microdata display terminals; Dataproducts Corp., Digital Equipment Corp. and IBM printers; Hewlett-Packard Co. magnetic tape drives; and Wang Laboratories, Inc. disk units.

The leading software suppliers in MIC's study that scored a 3.0 or better in all categories with five or more responses are Minicomputer Systems, Inc., Systems Management, Inc. and software houses that distribute Microdata computer products and have developed their own software, the survey said.

Finally, in addition to asking users to rate their systems, MIC requested that respondents identify any problem areas in the current small business computer systems.

Interfacing with other systems was cited as a problem by 20.4% of the uses, followed by manufacturer support and program languages. Equipment cost is considered a problem by only 6.8% of the survey participants and equipment design was pinpointed as a trouble spot by less than 3% of the users.

The full MIC report published in the May issue of *Small Business Computer News*, is available for $15 from MIC at 140 Barclay Center, Cherry Hill, N.J. 08034.

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Exxon Has a Lot Up Its Sleeve

By Brad Schultz
CW Staff

As the U.S. slides into a recession and petroleum prices soar, what is Exxon Corp. doing in the computer industry?

Maybe this:

- Going for the lead in supercontrollers — the switching systems emerging as integrators of an organization's DP, word processing and voice functions.
- Designing a minicomputer with no central processor or main memory and rumored to be capable of 60M bit/sec satellite communications.
- Developing an alternative to the CRT.
- Perfecting laser technology that may revolutionize nonimpact printing.
- Turning out microprocessors that already rival those offered by the largest chip-

Analysis

makers and that may form the basis of a major thrust into the desktop computer arena.

And a lot more besides, according to a recent study of why the largest U.S. petroleum supplier controls 15 DP-related manufacturers.

The nation's economic doldrums may spell a good opportunity for the high-flying Exxon to tackle the computer industry's established leaders. While the largest U.S. petroleum supplier sets records in quarterly profit totals, the largest computer supplier, IBM, is reportedly strapped for cash.

IBM needs more money to resolve enormous backlogs in its 4300 processor sales, some market analysts say, and to press ahead with processors not announced yet as well as with various communications and venture capital projects. A few Wall Street houses now expect much smaller 1980

(Continued on Page 110)

Klaus Luft

Nixdorf Acquires Software Company

BURLINGTON, Mass. — Moving into the IBM systems software arena, Nixdorf Computer Corp. recently acquired The Computer Software Co. (TCSC) of Richmond, Va.

Nixdorf, headquartered here, is a wholly owned subsidiary of West Germany-based Nixdorf AG, one of Europe's major computer makers.

The acquisition appears to fit well with the

(Continued on Page 109)

Japanese RAMs Superior, Tests Made by HP Show

PALO ALTO, Calif. — "Japanese-made 16K random-access memory (RAM) chips are superior to those made in the U.S."

Those may be fighting words in silicon enclaves, but they are essentially the conclusion to which Hewlett-Packard Co. came after conducting rigorous comparison tests on some 300,000 chips supplied by a total of six Japanese and U.S. manufacturers.

Wary of the quality of Japanese-produced 16K RAMs, HP had avoided Japanese imports until the U.S. supply began dwindling in 1977. At that time HP, the 12th largest purchaser of chips worldwide, qualified its first Japanese supplier after tests on its chips proved highly satisfactory.

However, HP considered the outstanding quality of the Japanese chips a fluke until the 16K RAM crunch hit in 1979. HP then tested two more Japanese chip makers and, much to its surprise, found the same glowing results, according to Richard W. Anderson, manager of HP's Data Systems Division. Anderson reported the company's test experience with Japanese semiconductors earlier this year at a seminar sponsored by the Electronic Industries Association of Japan in Washington, D.C.

Particularly startling were HP's comparisons of incoming failure and field failure rates. Japanese 16K RAMs showed a zero failure rate on incoming inspection; products from U.S. manufacturers had failure rates between .11% and .19% — about 100 bad devices per 50,000.

Moreover, field failure rates for 1,000 hours of operation ranged from .010% to .019% for Japanese chips and .059% to .267% for U.S. suppliers (see chart on Page 108).

Aside from these findings, HP's testing also revealed that Japanese 16K RAMs had:

- Fewer failures in production cycles.
- Lower scrap costs.
- Lower rework costs.

(Continued on Page 108)

U.S. Urged To Aid Semis

PALO ALTO, Calif. — Investment in complex, expensive and rapidly obsolate capital equipment is required if the U.S. semiconductor industry wants to build quality into components and keep technological pace with foreign competitors — especially Japan, according to Richard W. Anderson, manager of Hewlett-Packard Co.'s Data Systems Division.

However, in order for domestic device makers to continue to flourish in the international marketplace, the government must create a healthy investment climate, Anderson argued.

Anderson made his point earlier this year at a seminar sponsored by the Electronics Industry Association of Japan at which he

(Continued on Page 108)

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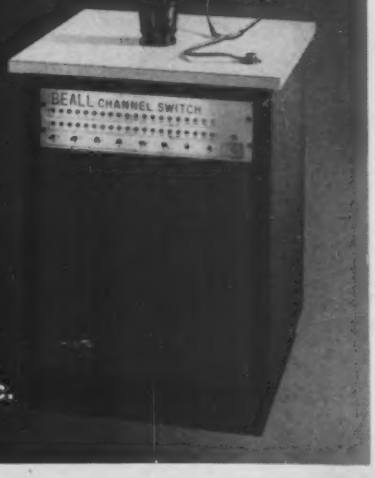

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Country	Vendor	Incoming Inspection Failure Rate	Field Failure Rate (%/1,000 hrs)	Quality Composite Index*
Japan	J1	0.00%	0.010%	89.9
	J2	0.00%	0.019%	87.2
	J3	0.00%	0.012%	87.2
U.S.	A1	0.19%	0.090%	86.1
	A2	0.11%	0.059%	63.3
	A3	0.19%	0.267%	48.1

* Measure of merit based on the two failure rates plus eight other parameters (cost, delivery, etc.) all equally weighted.

Comparison of Major Suppliers of 16K RAMs to HP

In Hewlett-Packard Tests, Japan's RAMs Found Better

(Continued from Page 107)

- Fewer production interruptions.
- Lower warranty costs.

Although the Japanese have been accused of dumping integrated circuits on the U.S. marketplace, Anderson noted the Japanese have not been the low price vendors.

Approaches to Manufacturing

Researching Japan's method of high-quality semiconductor production, Anderson said Japan takes two basic approaches to manufacturing. One is to screen out failures through repeated testing and inspection, and the other is to avoid building failures or failure mechanisms into the devices in the first place.

Japan's production is geared to a zero failure rate, he observed. This is achieved by a team approach involving production management in all organizational levels in the company.

In addition, results rather than procedures are emphasized. "Many U.S. firms follow mil specs blindly, even though those mil specs have little to do with achieving quality," Anderson maintained.

Moreover, the Japanese have been quicker to automate assembly to improve quality whereas the costs of device assembly pushed U.S. makers into assembling devices offshore, especially in developing countries. This has led to a quality control problem, Anderson charged.

Government Aid

However, in making his comments to seminar participants, Anderson acknowledged the Japanese government is heavily funding semiconductor research, a fact often cited by U.S. vendors charging unfair competition from the Japanese.

The U.S. government should take a lesson from Japan and create the investment climate necessary to allow U.S. companies to build quality into their semiconductor products lest U.S. makers lose status in the world marketplace, Anderson warned.

Anderson Urges Government Aid

(Continued from Page 107)

disclosed the results of HP's comparison tests on U.S. and Japanese-made 16K random-access memory (RAM) chips (see story above). The tests revealed Japanese-produced 16K RAMs are of significantly higher quality than comparable U.S. devices.

To finance the capital investment necessary for automation which would improve the devices' quality, U.S. manufacturers would have to earn 15% after taxes, Anderson figured. With the U.S. corporate tax rates, this is impossible, he noted.

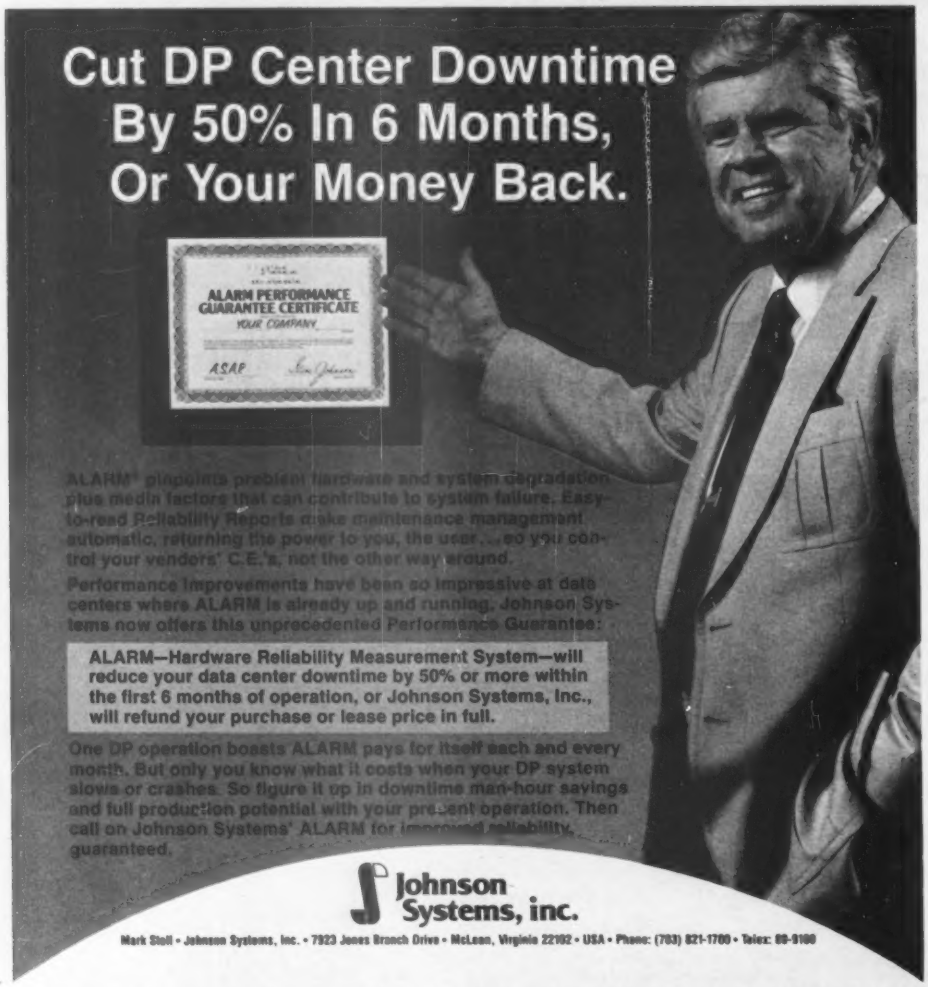
Recommended Actions

While he stopped short of suggesting the government finance semiconductor research and development, as the Japanese government does, Anderson recommended several actions the U.S. government could take to spur investment.

One of these steps is shortening depreciation schedules and allowing larger equipment expenditures to be expensed, which would free earnings for capital expenditures. Current depreciation rules were developed from industry models that do not apply to today's short product and equipment life cycles, he said.

If capital investment is to be financed from a company's aftertax earnings, then the government should lower corporate income and capital gains taxes, Anderson contended.

Finally, he suggested the government encourage investment by individuals through a more generous exemption of interest and dividend income, perhaps as high as $2,000 per person.



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W007

Datapoint Chief Hits 'Intrigue'

O'Kelley Charges Industry Shut Out of Rewrite

CW Washington Bureau

WASHINGTON, D.C. — "Confusing closed-door intrigue" is making it impossible for industry to participate in the attempt by Congress to rewrite the 1934 Communications Act, Datapoint Corp. President Harold O'Kelley charged here recently.

At a May 14 Capitol Hill press conference, O'Kelley called for additional public hearings on the bogged-down legislation to clarify the present status and direction of the rewrite effort in the Senate and House of Representatives.

"Because this legislation will have far-reaching impact, it is imperative that sufficient time and an adequate forum be provided for examination of the bill(s) by the American public and by the companies in the data processing, communications and related industries," he said.

O'Kelley called for "full public hearings" on H.R. 6121, now before the House Communications Subcommittee, and the corresponding bills in the Senate — S. 611 and S. 622.

Noting H.R. 6121 was produced by the subcommittee after public hearings on an earlier bill, H.R. 3333, the Datapoint executive said "it is essential . . . that the particulars of H.R. 6121 finally reported by the subcommittee . . . be explored and the impact of the bill analyzed."

Also, he said, "the many new issues which have been raised by recent amendments to the bill and the decision of the [Federal Communications Commission] in Computer Inquiry II can be fully addressed during these hearings."

O'Kelley is concerned the legislation will "either unclearly or incorrectly" resolve many of the controversial issues of communications industry deregulation. "Moreover, many critical issues may be left unresolved."

'Ambiguous' on AT&T

H.R. 6121 is "ambiguous" in its proposal to allow AT&T to compete in unregulated data processing and communications markets through fully separate subsidiaries, O'Kelley charged. He specifically complained the bill "does not fully define the AT&T-subsidiary relationship in such critical areas as the transfer of technical and marketing information, the reciprocal use of product development and manufacturing resources and the proper allocation of costs related to products marketed by the subsidiary."

The chances for comprehensive and fair legislation must not be "stymied by an artificial squelching of issues and solutions," O'Kelley said, arguing that "only full congressional hearings — in both the Senate and House — [can] vent the continuation of a legislative process which increasingly has become a confusing closed-door intrigue." Interested parties should be given a reasonable period of time to study any proposed legislation.

Nixdorf Buys Software Firm

(Continued from Page 107)

parent company's plans to introduce an IBM plug-compatible mainframe (PCM) for the German market later this year. That system will reportedly be comparable to IBM's 4331, according to Klaus Luft, vice-chairman.

Despite Nixdorf's intention to introduce a mainframe, Luft said the firm intends to continue to concentrate on distributed data processing (DDP) systems. To date about 8,000 of Nixdorf's 8870 distributed system have been installed worldwide, Luft said.

TCSC's major products are Extended DOS (Edos), an enhanced, fully supported extension of IBM Release 26.2 DOS, and Edos/VS, an enhanced, fully supported virtual storage operating system based on IBM's Release 34 DOS/VS.

Wider Base

With products that compete head-on with IBM, Nixdorf now plans to widen TCSC's Edos base on IBM machines as well as expand the software for Nixdorf users, Luft continued.

Two years ago Nixdorf decided to avoid a hardware-only PCM strategy. While the firm currently has the ability to provide users a mainframe environment, until now it lacked software to go with the hardware, Luft noted.

Nearly 50% of Nixdorf's 1979 revenue of $722 million was derived from mainframe users that employ Nixdorf's systems in a DDP network or as stand-alones in a DDP environment.

The U.S. subsidiary is the largest of the Nixdorf companies, with revenues of more than $100 million last year.

Commenting on the acquisition, Nixdorf President Carl H. Janzen said TCSC would help "enhance both our parent company's software capability and the overall breadth of the U.S. subsidiary's product offerings."

TCSC, founded in 1973, now has annual revenues reportedly in the $5 million range. It has 100 employees and claims to have 750 customers in 1,000 installations worldwide. In general its customers are IBM users with mainframes in the 370/135 to 158 range.

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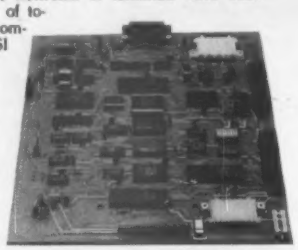

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PRIME Computer

Exxon Has Lots Up Sleeve

(Continued from Page 107)

profits from IBM, NCR Corp., Honeywell, Inc. and other prominent DP vendors than was predicted last year.

And many vendors have recently raised product prices, citing inflation as the reason.

How to Win Hearts?

Now that Exxon is No. 1 in *Fortune* magazine's tally of the top 500 U.S. companies, how can it win the hearts of DPers among the other 499?

As pointed out last week [CW, May 19], the debut of Intecom, Inc.'s integration-oriented supercontroller may tip Exxon's hand somewhat. Exxon Enterprises, Inc., the corporation's holding company for venture capital operations, controls Intecom and 14 other DP-related vendors through its Exxon Information Systems (EIS) division.

This is the last half of a two-part series on Exxon's relation to the computer industry.

While Intecom prepares to deliver its Series 40 Integrated Business Exchange (IBX/S40), an EIS affiliate located in Los Angeles is completing production of "a self-contained distributed processing system, realized in hardware and software" called the Delta 2.

In "Exxon Enterprises," a study now available from market research firm Yankee Group, Delphi Communications Corp.'s Delta 2 is termed "radically different from almost any other minicomputer-based system." The architecture has "no central processor, no main memory and no real 'on/off' or 'start' switch."

A dual-bus architecture ties together six different *types* of processors, each of which has exclusive access to a memory module and a section of the Delta 2 operating system, Yankee Group stated. This eliminates a need for main memory contention and keeps any failure of some Delta 2 processors from affecting the others.

According to Yankee Group, each processor can execute up to 7.5 million instructions per second (Mips). "A full-scale Delta configuration can support up to 32 processors, for total processing power of over 240 Mips," the market study maintained.

The Delta 2 could transmit data at 60M bit/sec if it were interfaced with a communications satellite, Yankee Group suggested. Depending on the configuration, a Delta 2 could support up to 4,000 terminals and/or up to 400 300M-byte disk drives and/or switching for up to 10,000 telephone lines and 300 trunks.

Exxon Enterpises may give Satellite Business Systems, Xerox Corp.'s Xerox Telecommunications Network and other communications services a run for their money if users start driving networks with the Delta 2, Yankee Group asserted. Delphi's system could also drive an Exxon value-added network in competition with GTE Telenet Communications Corp. and Tymnet, Inc., the research firm speculated

Meanwhile, a replacement for the CRT may come from two EIS organizations in California's Silicon Valley: Kylex, Inc., which makes liquid crystal displays (LCD) in Mountain View, and Exxon Enterprises' Electrophoretic Image Displays (Epid) Division in Sunnyvale. Both LCD and electrophoretic technologies involve applying electric current to a liquid sandwiched between slabs of glass.

Such circuits display part of an alphanumeric character. They allow construction of video terminals that are far more compact than CRT units and consume less power while being less of a health hazard. However, LCD and electrophoretic technologies are presently far more costly than CRT technology.

Yankee Group suggested that those cost differentials will narrow rapidly as Kylex and Epid research continues under generous Exxon subsidies.

In Elmsford, N.Y., Optical Information Systems makes semiconductor laser devices. Exxon Enterprises could easily produce laser-driven, nonimpact printers based on that subsidiary's products, Yankee Group observed.

Lasers from Elmsford may support nonimpact printers similar to IBM's Model 6670 as well as communicating word processors, facsimile machines and microcomputers from Vydec, Inc., the Qwip Systems Division and Zilog, Inc., respectively — all components of EIS.

Already a leading vendor of microprocessors, Zilog might choose to tackle leaders in the desktop computer arena, Yankee Group noted, by engaging the newly formed Exxon Sales Corp. as a marketing arm. Exxon Sales currently markets products for Vydec, Qwip and Exxon Enterprises' Qyx Division, a maker of intelligent typewriters.

Exxon Enterprises also has affiliates working on voice response systems already interfaced to products from other EIS organizations, Yankee Group continued. A hush-hush-"skunk group" named Xonex is designing workstation prototypes in Princeton, N.J., the firm added, and thin-film recording heads for computer mass storage devices are produced by Magnex Corp., an affiliate in San Jose, Calif.

Exxon Corp. is not the only petroleum supplier to have penetrated the computer industry. Sun Information Services Co., a Sun Oil Co. subsidiary, caters to the disaster recovery and security needs of DP users. Amoco Computer Services Co., owned by Standard Oil Co. of Indiana, sells systems to manage shipping and security for large manufacturers.

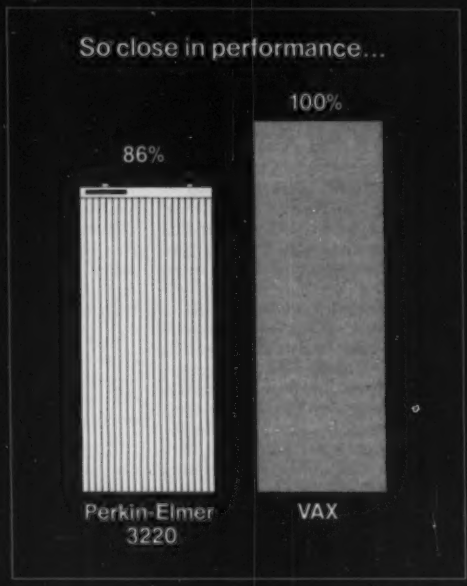
But the computer industry has never known such an entrant as Exxon, whose financial stature and diversity of technical resources must seem ominous to many veteran DP vendors as they cope with severely distressed economic conditions.

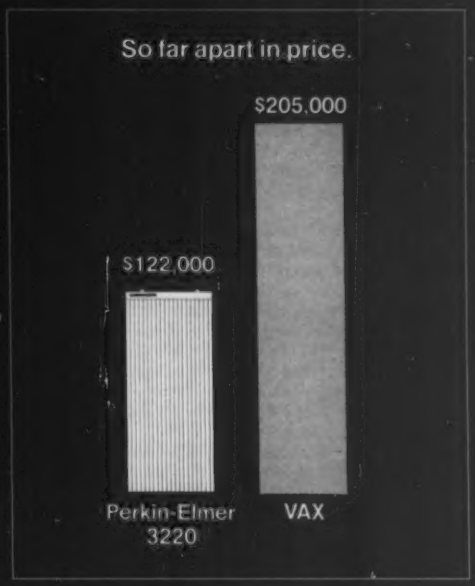
The Report

The study entitled "Exxon Enterprises" is part of the Yankee Group's Communications Information Systems Planning Service, which includes 12 reports along with a variety of seminars and other services.

The cost of the service is $9,500.

The Yankee Group can be reached at P.O. Box 43, Harvard Sq., Cambridge, Mass. 02138.





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In a Dark Courtroom

U.S. vs. IBM Trial Marks Fifth Anniversary

By Connie Winkler
CW Staff

NEW YORK — The U.S. vs. IBM antitrust trial was five years old this month. But Courtroom 110 at Foley Square was dark on the May 19 anniversary, as it has been for two months.

The trial has proved to have a much longer life than anyone probably imagined when lawyers from the Justice Department and IBM's law firm of Cravath, Swaine & Moore walked into court May 19, 1975. At that time *Computerworld* reported predictions that the trial would be finished in a year, with time out for summer recess.

The then-head of the government trial team, Raymond M. Carlson predicted, at one of the pretrial meetings in early 1975 that the trial would take 60 days. There is disagreement today as to whether Carlson was referring to the entire trial or to the government's case.

Edelstein Optimistic

Judge David N. Edelstein was optimistic, too. *Time* magazine reported that in 1973 Edelstein said he would "prove the legal system is so advanced and so sophisticated that there is no case that's unmanageable."

The trial did not begin until six years and 122 days of meetings after the case was filed Jan. 17,1969, the last working day of the Johnson Administration.

Today the trial has spanned 682 days of court and filled about 103,000 pages of transcript. No one person has been in the courtroom every day — not even Edelstein — because in the early part of the trial, witnesses' depositions were simply read to a court stenographer in an otherwise empty courtroom.

IBM has four economic experts yet to call on its witness list and it is uncertain when they will take the stand. Once IBM rests its defense, there will be the rebuttal case in which both sides will call witnesses to summarize their positions.

'No Excuse'

The government's head trial attorney Robert J. Staal chastised IBM for the delay in the economists' taking the stand. "There's no reason or excuse for the delay," Staal said last week, noting that it has been about 75 days since the last IBM witness appeared. "If the four economic witnesses had been presented live they would now be off the stand."

Instead the parties agreed that the IBM economists would present their direct testimony in writing, the first narrative to be delivered to the government by April 7.

The government is still waiting for the narratives.

IBM's head counsel Thomas D. Barr said he did not wish to comment on Staal's statement, but called it "silly." He had previously noted that both parties and Edelstein are processing 5,000 to 6,000 IBM documents which IBM wants presented to the court before it proceeds.

Liability First, Relief Next, Trial Judge Decides

NEW YORK — Judge David N. Edelstein has ruled that there first be a decision on liability in the U.S. vs. IBM case before the court considers the question of relief, a ruling the Justice Department believes will speed the final outcome of the case.

"By postponing any litigation dealing with the details of a specific relief plan, it removes a phase from this principle case," the government's lead trial lawyer, Robert J. Staal, said.

In March Staal had asked Edelstein for the bifurcation — splitting — of the case so that there is a ruling on IBM's innocence or guilt before ruling on relief, or what's to be done if IBM is found to be a monopoly. The government has said it will ask for structural relief — a breakup of the giant computer manufacturer.

IBM, in chambers meetings with the judge, had argued the relief issue should be considered along with liability. IBM counsel Thomas D. Barr said he feared IBM would be pelted with lawsuits during the interim of the liability ruling and the relief hearing.

In his May 5 memorandum, Edelstein said the relief hearing should be held only after the court rules on the issue of liability — and only if the government wins.

"To submit plans before such a decision would run the risk of substantial wasted effort" in the event IBM wins, if the government relief plans are not adequate or if the goverment relief plans are "rendered obsolete by changes in the market or within IBM during this court's deliberations on liability," Edelstein said.

Comdex '80 Set For Las Vegas In November

FRAMINGHAM, Mass. — This year's Comdex conference and exposition, scheduled for Las Vegas on Nov. 19-21, is expected to be larger than last year's premier show.

Already, 170 companies have signed up for about 80% of the available exhibit space and Sheldon Adelson, president of the sponsoring Interface Group, expects an early sellout.

The Comdex '80 exhibit floor will be more than double the size of the Comdex '79 floor, he noted.

Comdex is geared to independent sales organizations and the manufacturers who sell all or part of their product lines through such independent and third-party channels.

Attendance last year was more than 4,000; this year a larger turnout is expected, according to Adelson.

The conference portion of the show will focus on general business and financial subjects of special interest to attendees, with emphasis on techniques for surviving high inflation and high interest rates.

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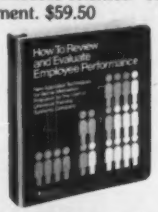

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Bad News and Good News

Recession Here, But Not Too Bad, Industry Told

By Jeffry Beeler
CW Staff

NEWPORT BEACH, Calif. — Computer industry executives got some bad news and some good news here recently about the U.S.'s short-term economic outlook.

The bad news is that the country has finally slipped into the recession economists have long been forecasting in vain. The good news is that the downturn, though expected to be painful and unpleasant, will probably last only two to three quarters and will prove only moderately severe.

So said the U.S. Commerce Department's chief economist, Dr. Courtenay Slater. In a keynote address recently at Univac's third annual seminar on productivity, Slater allayed fears that this year's long-awaited recession might equal or even surpass in severity its 1974-1975 counterpart.

Most economic indicators suggest the current downturn will probably be about "average" for postwar U.S. recessions, Slater told an audience of press representatives and financial analysts.

Inflation and Productivity

Slater also offered some reasonably reassuring words about the nation's steadily worsening inflation, predicting that although it seems destined to continue for some time to come, inflation probably will not prove to be as severe during the coming months and years as it has been during the recent past.

Moreover, if the U.S. can somehow boost its productivity, the prospects for cutting inflation to less than 10% and keeping it there look reasonably promising, she added.

Unfortunately for the economy, efforts to combat declining productivity have fared rather poorly in recent years. Since 1973, the nation's average annual rate of productivity growth has slumped to slightly more than 1%, compared with more than 2% for 1967-1973 and more than 3% for 1950-1967.

Why has productivity growth dropped so precipitously? One possible explanation, Slater said, is that the causes of falling productivity have never been fully understood. In fact, about 60% of the U.S. post-1950 productivity decline remains unexplained.

Some observers have cited factors like decreased research-and-development expenditures, rising energy costs and a weakening work ethic as possible reasons for the continuing productivity slump, but Slater rejected all such explanations.

She also left the clear impression that declining productivity might not be quite as much of a cause for alarm as many people have imagined. In part, Slater explained, the U.S. shrinking rate of productivity growth reflects a recent shift in its economic and social priorities.

Since the early 1960s, many of the resources the nation might otherwise have used to bolster its economic output have gone instead into efforts to strengthen environmental safeguards, increase worker safety and improve factory working conditions. The decision to pay increased attention to "quality-of-life" issues has inarguable social merit, but the benefits such a choice produces do not typically show up in conventional measures of productivity, Slater said.

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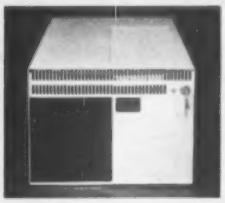

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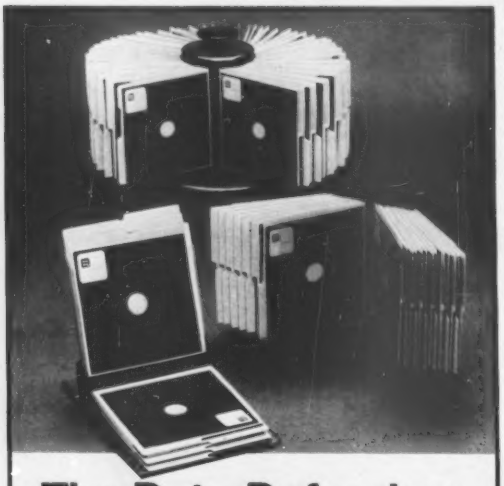

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Olde Worlde Products, Inc. has announced that it will be one of the first in the U.S. to install a System 80 Computer, the most recent edition to the Univac product line.

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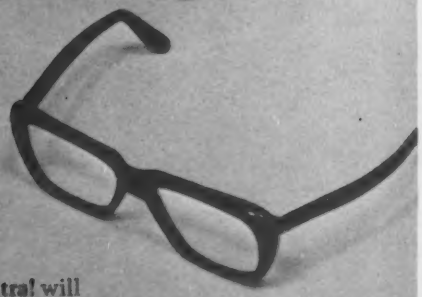

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Computerworld Extra! will also be different in its focus. The entire issue will be devoted to one subject: "Software Systems in the '80s," and it will contain articles by some of the world's leading authorities on the subject, including Tom Mueller, Dixon Doll, Stephen Robinson, Dan McCracken and the experts at Auerbach Publishers and Datapro Research.

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DEC, Intel and Xerox Developing Low-Cost Net

LOS ANGELES — Three major computer vendors — Digital Equipment Corp., Intel Corp. and Xerox Corp. — are working jointly to develop electrical, logical and protocol specifications for a low-cost local area communications network for information processing.

Begun last spring, the network consists of a coaxial cable and communications transceivers designed to link different kinds of computers, peripherals and office equipment together in one building or a complex of closely grouped buildings. Each connected device will contain a control element allowing it to communicate on the cable through its transceiver. Specifications are expected to be published in the third quarter, according to Xerox.

Xerox is providing the basic local area network designs represented in its Ethernet network capability; DEC is providing system design expertise in communications transceivers and microcomputer, minicomputer and mainframe computer networks; and Intel is providing expertise in the partitioning of complex communications functions into microcomputer systems and very large-scale integration.

In order to encourage communications compatibility over a broad range of equipment, the use of specifications by other corporations and organizations will be sought, Xerox said. Additionally, the three vendors will cooperate with any standards organizations expressing interest in adopting the standards.

Although testing is incomplete, several specifications have already been established. Among them are a network operation capability of 10M bit/-sec and a typical configuration that will consist of one or more segments of coaxial cable, each of which can be up to 500 meters long.

To promote widespread use of the new communications capability, Xerox, which holds patents on the basic Ethernet techniques, said it will make patent licenses available to interested parties.

Honeywell Grant To Foster Study Of Technology

MINNEAPOLIS — Honeywell, Inc. is sponsoring a $5 million grant to fund programs in computer sciences, microelectronics and other technologies at institutions of higher education that have close ties with major Honeywell operations.

The first award, a $3 million grant that will be given out over a five-year period, has been awarded to the University of Minnesota to help support its Center for Microelectronics and Information Sciences, to endow a Honeywell chair in management information systems and to support the university's instructional and fellowship programs.

The center emphasizes advanced research in microelectronic design, distributed and parallel processing and automation and applications. It is also committed to expanding educational opportunities in high technology, according to Roger Staehle, dean of the university's Institute of Technology.

In awarding the grant, Honeywell Chairman and Chief Executive Officer Ed Spencer said, "As an advanced technology company, we share common teaching and research interests with higher education. As corporate citizens, we believe it is important to assist colleges and universities to develop graduates trained in the latest management and technical skills."

An initial $2 million was contributed to the university center by Control Data Corp. recently. An additional $6 million from other sources is expected to be given by the end of the year, according to Staehle.

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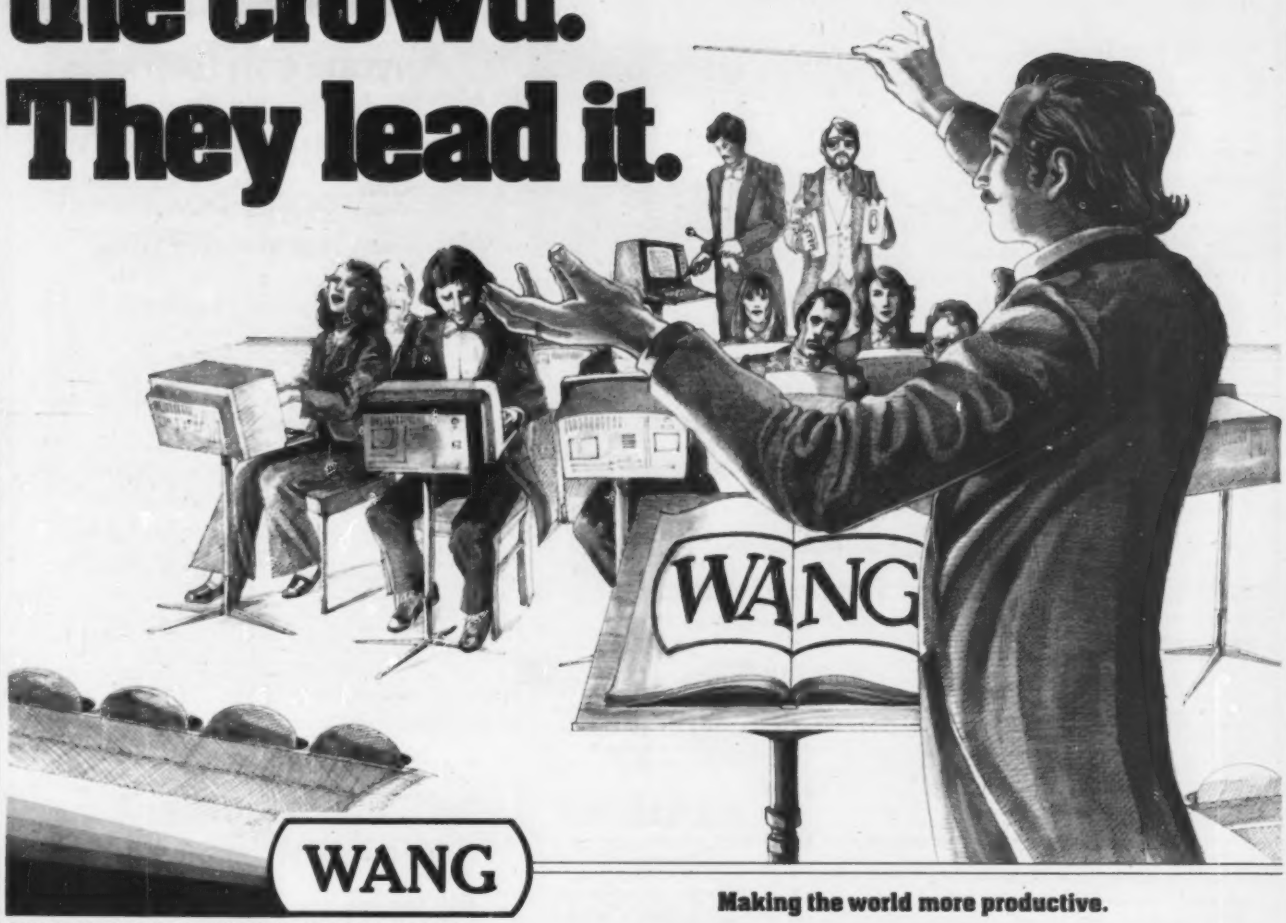

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We have an exciting technical and professional environment for the career-oriented DP specialist. The majority of our software development is targeted for large IBM 3032 mainframe computers, and most programs are written in COBOL through the facilities of SPF/TSO. Our new mainframe applications feature interactive processing, data base (IDMS), and structured programming and design.

In addition to mainframe systems, we employ a variety of minicomputers manufactured by IBM, DEC, Data General, and Wang. You'll find a broad range of technical environments in which to work.

Systems Programmers should have several years of OS and BAL experience and the ability to develop and present creative solutions to technical problems.

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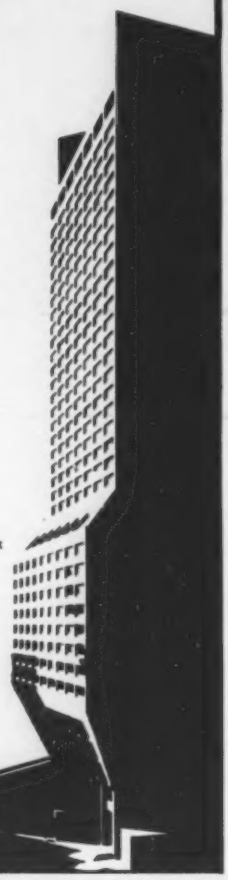

TECHNICAL SUPPORT SUPERVISOR

Henry Ford Hospital is now accepting applications and resumes for positions as Technical Support Supervisor. The position available is located at the Hospital's Administrative Services Office located in TROY.

As Supervisor, you will oversee staff work concerning the software packages and operating systems for our IBM 3031 processor. We are currently operating under VM/370 and DOS and are planning a conversion to VM/370 and OS/VSL which will be completed by the third quarter of 1980. Plans also include the addition of a 4341 processor in the fourth quarter of 1980. Current responsibilities include support of TASKMASTER, TOTAL, SYNCSORT, PANVALET, EASYTRIEVE and other systems. We are also planning the addition of tape and disk management systems, as well as other OS related software.

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Henry Ford Hospital
Employment Center
Randy L. Kelley,
Senior Employment Representative
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Detroit, Michigan 48202
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SYSTEMS ANALYST

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Our facilities are located in Nashua, N.H. and Natick, MA as we await completion of our new facility in Milford, N.H. opening in September.

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14 Tech Circle
Natick, MA 01760

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Palo Alto	415/856-0600
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Van Nuys	213/781-4800
Torrance	213/540-7500
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San Diego	714/231-1900
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Englewood	303/571-4450
Connecticut	
Hartford	203/522-6590
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Atlanta Central	404/588-9350
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Chicago	312/782-0857
Northfield	312/446-8395
Oak Brook	312/986-0422
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Boston	617/482-7613
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Southfield	313/352-6520
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St. Paul	612/771-0544
Missouri	
St. Louis County	314/862-3800
St. Louis Downtown	314/231-4880
Kansas City	816/474-3393
New Hampshire	
Nashua	603/880-4047
New Jersey	
Cherry Hill	609/482-2600
Edison	201/494-2800
Paramus	201/845-3900
Union	201/687-8700
New York	
Midtown	212/736-7445
Wall Street Area	212/962-8000
Long Island	516/364-0900
White Plains	914/683-9300
North Carolina	
Greensboro	919/294-6590
Ohio	
Cincinnati	513/769-5080
Cleveland	216/771-2070
Columbus	614/221-2070
Oregon	
Portland	503/223-6160
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Philadelphia	215/665-1717
King of Prussia	215/265-7250
Pittsburgh	412/261-6540
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Dallas	214/387-1600
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PROGRAMMERS

2-6 yrs. IBM (or other large system) exp. Thorough knowledge of COBOL. Prefer OS/VS1, MVS, CICS, TSO, JCL and BAL or general banking applications knowledge desired.

SR. SYSTEMS ANALYSTS
SYSTEMS ANALYSTS

3-5 yrs. experience in COBOL, various banking applications and analysis and design.

SR. SYSTEMS SOFTWARE PROGRAMMERS
SYSTEMS SOFTWARE PROGRAMMERS

2-6 yrs. experience OS/VS1, VM/370, MVS, UCS, TSO, VSAM or COBOL, BAL, CPCS, OS/VS1, MVS knowledge required.

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Minneapolis

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- **ANS/COBOL**
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SYSTEMS PROGRAMMER

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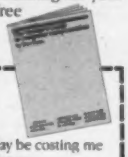

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Proj ldr exp w/bkgd in IBM coding/analysis/long range planning. Be respon. for development multiple projects. BANKING BKGND highly prfrd.

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Corning Community College is now accepting applications for an anticipated opening for a Computer Science/Data Processing Instructor. This position will be tenure-track and is contingent upon funding for the 1980-81 academic year. The individual will be instructing undergraduate classes and will be using a DEC 20-60 interactive system and will also be responsible for curriculum development. Minimum requirement is a B.S. in Computer Science or related field with a Master's preferred.

Interested candidates should submit detailed resume by May 29, 1980 to:

Director of Personnel
Corning Community College
Corning, New York 14830

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Requires background in Assembly language.

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All qualified applicants contact Ms. Beverly Steele, Personnel Administrator, TRW Controls Corporation, Houston, Texas at (713) 780-0102.

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DIRECTOR

Administrative Computer Center

University of Maryland
College Park

The University of Maryland, College Park Campus, seeks an experienced and highly qualified individual as Director of the Administrative Computer Center.

This Associate Staff position reports directly to the Vice Chancellor for Administrative Affairs at the College Park Campus and is responsible for a staff in excess of 60 full time and 10 part time people. The Center has a large UNIVAC 1108 system and an H.P. 300 (2 meg.). Additional H.P. 3000's are being installed as part of a multiple-campus plan for implementation of an Administrative Computing Network.

The Center supports all the administrative computing needs of the College Park Campus, including student records, student billing, financial systems, and a large library system. The Center Director is instrumental in the process of shaping the Administrative Network and interacts closely with other University campuses concerning network service and standards.

Candidates should have a minimum of a Bachelor's Degree, although an advanced degree is preferred. At least 6 years of significant management experience in the computing area in an institution of higher education is required. The candidate should have demonstrated ability in budgeting, planning, and a broad range of technical matters in a comparable computer facility. The position is immediately available.

Salary based on qualifications, minimum of $40,000.

Send application/nomination, resume and three professional references with postmark not later than June 6, 1980 to:

Dr. Gene T. Sherron, Chairman
SearchCommittee for Director of
Administrative Computer Center
University of Maryland
Room 1108, Main Administration Bldg.
College Park, Maryland 20742

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Interested applicants should forward their resumes to:

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Departmental Personnel Officer
Metropolitan Dade County
Data Processing Division
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A MEMBER OF NATIONAL COMPUTER ASSOCIATES

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data processing

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Our environment consists of an IBM 3032 to be operating under MVS with IMS DB/DC. We offer flexible hours, highly competitive salaries, and excellent benefits including a dental plan, credit union, educational assistance and relocation package. Previous experience in a Blue Cross and Blue Shield or similar environment is preferred. For immediate consideration, call Kathy Jensen, collect, 816-932-5262, or forward your resume, in confidence, to her attention.

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IBM 370/148 with Local and Remote 3270 Network
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Data Processing

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W009

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ROBERT HALF

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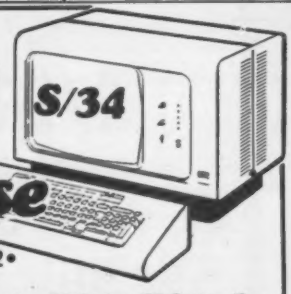

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Please present bids in a sealed envelope to the College Business Office by or before 3:30 PM, DST, June 9, 1980, at which time the bids will be opened and read.

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The Board of Education or other authorized representatives of Mt. Hood Community College District reserve to themselves the right to reject all bids and to waive any and all irregularities as they may deem best for the interest of Mt. Hood Community College.

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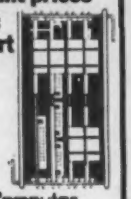

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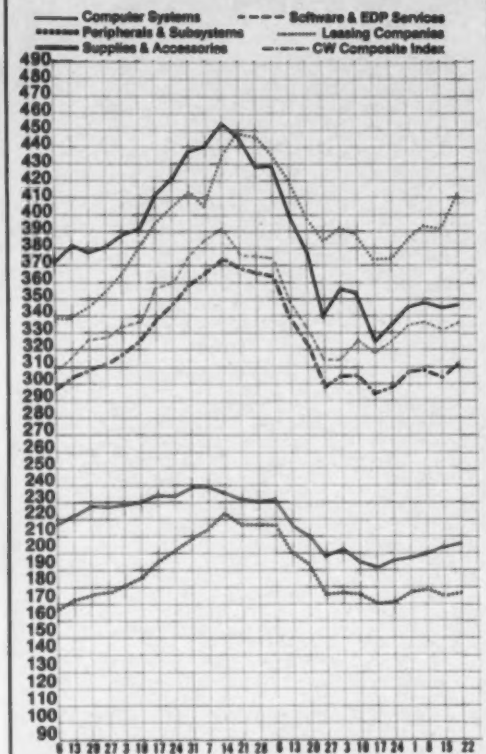

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Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 21, 1980

All statistics compiled, computed and formatted by TRADE QUOTES, INC. Cambridge, Mass. 02139

E X C H		1979-80 RANGE (1)	CLOSE MAY 21 1980	WEEK NET CHANGE	WEEK PCT CHANGE
	COMPUTER SYSTEMS				
A	AMDAHL CORP	18- 89	18 7/8	+ 1/8	+1.3
N	BURROUGHS CORP	59- 87	64	+2 1/4	+3.6
O	COMPUTER AUTOMATION	9- 44	16 1/4	+ 1/4	+1.5
N	CONTROL DATA CORP	23- 81	49	+ 1/2	+1.0
O	CRAY RESEARCH INC	8- 58	50 1/4	+1 1/2	+3.0
N	DATA GENERAL CORP	42- 74	57 1/8	-2 3/8	-3.9
N	DATAPOINT CORP	17- 82	46 1/4	-3 1/8	-6.3
N	DIGITAL EQUIPMENT	39- 80	68 7/8	- 3/4	-1.2
N	ELECTRONIC ASSOC.	2- 13	8	+ 1/8	+1.5
A	ELECTRONIC ENGINEER.	9- 19	13 3/8	- 3/8	-2.7
N	FOUR-PHASE SYSTEMS	19- 47	23 3/4	+1 3/4	+7.9
N	FORBORO	28- 44	32 1/4	- 7/8	-2.6
O	GENERAL AUTOMATION	7- 26	7 3/8	- 1/8	-1.6
O	GRI COMPUTER CORP	1- 3	1/2	0	0.0
N	HEWLETT-PACKARD CO	24- 73	57 5/8	+1 1/4	+2.2
N	HONEYWELL INC	43-100	72 3/4	+ 5/8	+0.8
N	IBM	51-321	52 7/8	- 1/8	-0.2
N	MANAGEMENT ASSIST	9- 29	11 1/2	+1 1/8	+10.8
O	MANUFACTURING DATA S	9- 38	30 1/2	+ 1/2	+1.6
O	MINI-COMPUTER SYST	2- 8	3 1/8	- 3/8	-10.7
O	MODULAR COMPUTER SYS	7- 18	13 3/8	+ 5/8	+4.9
N	NCR	37- 81	53	-1 1/8	-2.0
N	PRIME COMPUTER INC	9- 32	17 1/8	+ 3/8	+2.2
N	PERKIN-ELMER	17- 47	38 7/8	- 7/8	-2.2
N	SPERRY RAND	33- 68	45 3/4	- 1/2	-1.0
A	SYSTEMS ENG. LABS	11- 24	15 3/4	+ 3/8	+2.4
N	TANDEM COMPUTERS INC	13- 54	51 3/4	+1 3/4	+3.5
N	TEXAS INSTRUMENTS	78-198	95	+2 5/8	+3.1
A	WANG LABS.	8- 40	32 5/8	+ 7/8	+2.7
	LEASING COMPANIES				
O	BOOTHE FINANCIAL CP	13- 21	15	0	0.0
O	COMDISCO INC	3- 21	10 1/2	+ 1/4	+2.4
A	COMMERCE GROUP CORP	1- 2	2	+ 7/8	+77.7
A	COMPUTER INVSTRS GRP	1- 7	2	- 1/8	-5.8
O	CONTINENTAL INFO SYS	2- 15	1 3/4	- 1/4	-12.5
M	DATRONIC RENTAL	1- 4	2 1/2	0	0.0
A	DCL INC	3- 6	5	0	0.0
N	DPF INC	5- 14	6 1/8	0	0.0
N	ITEL	2- 36	3	0	0.0
N	LEASCO CORP	24- 73	63 1/4	-3 3/4	-5.5
O	LEASPAC CORP	1- 4	1/8	0	0.0
A	PIONEER TEX CORP	2- 7	2 3/4	0	0.0
N	U.S. LEASING	12- 28	14 5/8	+1	+7.3
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 3	2 7/8	+ 1/8	+4.5
O	ANACOMP INC	8- 24	12 1/4	0	0.0
O	ANALYSTS INTL CORP	3- 6	4 1/4	0	0.0
A	APPLIED DATA RES.	7- 17	9	+ 3/8	+4.3
N	AUTOMATIC DATA PROC	24- 48	38 3/4	- 1/4	-0.6
O	COMPUTEN HORIZONS	1- 9	3 1/4	0	0.0
O	COMPUTER NETWORK	4- 16	4 5/8	- 3/8	-7.5
N	COMPUTER SCIENCES	8- 24	19 7/8	+ 5/8	+3.0
O	COMPUTER TASK GROUP	1- 9	8 3/4	+ 1/4	+3.8
O	COMPUTER USAGE	2- 5	2 3/4	- 1/8	-4.3
O	COMPUT AUTO REP SVC	4- 18	4 3/8	+ 1/8	+2.9
O	COMSHARE	6- 26	12 3/4	+ 1/2	+4.0
O	CULLINANE CORP	14- 36	36	0	0.0
O	DATA DIMENSIONS INC	1- 9	1 1/8	+ 1/8	+12.5
O	DATATAB	1- 4	1 1/4	0	0.0
O	DSE CORP	4- 9	6 5/8	- 3/8	-5.3
N	ELECTRONIC DATA SYST	19- 28	21 7/8	+ 7/8	+4.1
O	INFORMATICS INC	9- 22	14 1/2	+ 3/4	+5.4
O	INSYTE CORP	1- 3	1 5/8	+ 1/8	+8.3
O	IPS COMPUTER MARKET.	2- 4	3	0	0.0
O	KEANE ASSOCIATES	3- 9	5 1/2	0	0.0
O	KEYDATA CORP	1- 5	2 1/4	0	0.0
A	LOGICON	10- 23	17 5/8	+ 1/4	+1.4
O	MATHEMATICA INC	5- 13	6 1/2	- 1/2	-7.1
O	NATIONAL DATA CORP	7- 18	16 1/2	+ 3/8	+2.3
N	PLANNING RESEARCH	4- 18	6	0	0.0
O	PROGRAMMING & SYS	1- 1	5/8	0	0.0
O	RAPIDATA INC	3- 7	4 7/8	+ 1/8	+2.6
O	REYNOLDS & REYNOLD	18- 36	24 1/2	+1	+4.2
O	STSC INC	4- 11	8 1/2	- 1/4	-2.8
O	SCIENTIFIC COMPUTERS	3- 16	13 1/4	+ 1/4	+1.9
N	TYMSHARE INC	18- 58	47 1/4	+1 3/8	+2.9
A	URS SYSTEMS	5- 12	10 3/4	+ 1/4	+2.3
N	WYLY CORP	1- 9	7 5/8	+ 1/4	+3.3
	PERIPHERALS & SUBSYSTEMS				
N	AM INTERNATIONAL	13- 32	16 3/4	+ 7/8	+5.5
N	AMPEX CORP	10- 29	20 1/2	- 1/4	-1.2
A	ANDERSON JACOBSON	5- 16	11 3/8	- 3/8	-3.1
N	APPLIED DIG DATA SYS	5- 22	6 5/8	+ 3/4	+12.7
O	AUTO-TROL TECHNOLOGY	14- 39	28 3/4	-1 1/4	-4.1
O	AGEMIVE INT'L	3- 8	6 3/4	- 1/8	-1.8
A	BOLT,BERANEK & NEW	6- 22	17 3/8	- 1/8	-0.7
N	BUNKER-RAMO	10- 32	26 1/2	- 1/4	-0.9
O	CAMBRIDGE MEMORIES	1- 9	1 7/8	+ 1/8	+7.1
O	COMPUTER DEVICES INC	5- 9	5 3/4	0	0.0
N	CENTRONICS DATA COMP	18- 54	35 5/8	+7 1/2	+26.6
O	COGNITRONICS	1- 4	2 3/4	+ 1/8	+4.7
O	COMPUTER COMMUN.	4- 10	3 1/2	- 3/8	-9.6
O	COMPUTER CONSOLES	4- 29	12 1/2	+1 1/2	+13.6
A	COMPUTER EQUIPMENT	3- 7	5 1/2	+ 1/2	+10.0
O	COMPUTER TRANSCEIVER	1- 5	2	0	0.0
O	COMPUTERVISION CORP	5- 58	45 5/8	- 1/4	-0.5
N	CONRAC CORP	13- 26	17 1/4	+ 7/8	+5.3
	SUPPLIES & ACCESSORIES				
A	AMERICAN BUS FROOS	6- 12	10 1/4	+ 3/8	+3.7
O	BALTIMORE BUS FORMS	1- 4	3/4	0	0.0
N	BARRY WRIGHT	14- 34	24 3/4	0	0.0
O	CYBERNATICS INC	1- 1	3/4	0	0.0
O	DUPLEX PRODUCTS INC	7- 16	12 3/8	+ 7/8	+7.6
N	ENNIS BUS. FORMS	5- 21	15 1/8	- 1/8	-0.8
N	3M COMPANY	63- 86	84 1/2	- 1/8	-0.2
O	MOORE CORP LTD	26- 34	24 5/8	- 1/8	-0.4
N	NASHUA CORP	18- 37	24 1/8	+1 7/8	+8.4
O	STANDARD REGISTER	20- 29	27	+1 1/2	+5.8
A	TAB PRODUCTS CO	8- 22	18	- 3/4	-4.0
A	WABASH MAGNETICS	10- 22	11 7/8	+ 3/8	+3.2
N	WALLACE BUS FORMS	18- 33	27 3/8	+ 1/2	+1.8

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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